

AN EXAMINATION OF THE EFFICIENCY  
OF THE MALAYSIAN STOCKMARKET

Ph.D. DISSERTATION

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Since its proposal in 1970, Fama's "Three Form" model of stockmarket efficiency has become widely accepted as the framework for examining stockmarket behavior. Using this framework, researchers have carried out many intensive studies of the Western stockmarkets. From these studies, the great majority of workers in this field have concluded that the major Western markets (principally the US and the British) are efficient in the semi-strong form. However, this general picture of efficiency masks two disturbing features. Firstly, it is apparent that not all semi-strong information are treated with the same speed and understanding. Secondly, it appears that in a supposedly semi-strongly efficient market, some weak form information are not efficiently treated. It is therefore doubtful whether the Fama model can be applied in its entirety.

Concurrently, there are indications that many less developed markets do not match the US and British markets' efficiency. Nor do all markets possess the complete set of 'ideal conditions which are assumed to be given in efficiency debate. It would seem to be even more difficult to apply the Fama model to these markets. Based on these realisations, this dissertation begins by hypothesising that: (1) Stockmarket efficiency is dependent on the nature of each market and that there is no universal form of market efficiency; and (2) The Fama model is over-rigid in its partitioning of information into three "concentric" sets. A new model for the stockmarket information system is therefore proposed - the Mosaic Model. In brief, the Mosaic Model proposes that different markets produce different amount of different types of information and that each market deals with the information produced with different degree of efficiency. Such differences arise because of the differences which exist in the sophistication and inclination of the markets.

This dissertation begins with an extensive literature review to provide support for the Mosaic Model within the context of the Western Markets. It then proposes to validate the Mosaic Model further by testing it in the less mature Malaysian market which is very different from the US or the British market. The efficiency with which this market treats seven different types of information is tested by using direct replicate of tests previously performed on the Western markets or close facsimiles of them. These tests reveal that there are considerable differences in the way the Malaysian market deals with these seven types of information compared with the Western markets. In all cases, the Malaysian market appears to be less efficient. The validity of the Mosaic Model is therefore deemed to be upheld.

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## CHAPTER ONE

### PURPOSE AND ORGANISATION

#### 1.1 - Contents

Chapter One of this dissertation is divided into the following sections:-

1.2 - INTRODUCTION

1.3 - PROBLEMS OF EFFICIENT MARKET HYPOTHESIS (EMH) RESEARCH

1.4 - OBJECTIVES OF THE STUDY AND PROPOSAL FOR A NEW MODEL FOR  
DESCRIBING STOCK MARKET EFFICIENCY

#### 1.2 - Introduction

The field of stockmarket efficiency and its related field of capital asset pricing constitute two of the most intensely researched areas in the sphere of economic research. In the thirty years since modern research started in this area, enormous contributions have been made to the understanding of the behavior of securities. A majority of the researchers in this field are now in general agreement regarding the validity of the hypothesis that has been made in respect of the efficiency of the securities market. Indeed, findings and jargons of this field of research have even become common knowledge among professional and lay practitioners of the art of investment. However, wide acceptance among academics and wide dissemination of its findings have not led to any consensus as to the validity of its central hypothesis- the Efficient Market Hypothesis (EMH). Until today, the central theme of EMH is still rejected by most practitioners and disputed by many academics as well. Admittedly, it is true to say that in science consensus cannot be taken as a hallmark of the correctness of a theoretical model as shown by the long acceptance of the Ptolemaic view of the universe. However, it is significant to note that there appeared to have been no slow-down in the number of papers revealing anomalies which cannot be explained by

EMH. Furthermore, a significant number of wellknown researchers and commentators in the field appear to have moved back by a lesser or greater extent from their earlier strong support of EMH. It would thus appear that this field can still provide useful ground for research in spite of the intensity of previous and ongoing work.

The idea that a stockmarket can be "efficient" was first propounded by Fama in his landmark article of 1970. In it, he defined an efficient stockmarket as follows:-

"The primary role of the capital market is the allocation of the ownership of the economy's capital stock. In general terms, the ideal is a market in which prices provide accurate signals for resource allocation: that is, a market in which firms can make production/investment decisions, and investors can choose among the securities that represent ownership of the firms' activities under the assumption that security prices at any time "fully reflect" all the available information. A market in which prices always "fully reflect" available information is efficient."

In such a market, the price of every security would adjust instantly to the arrival of any new information regarding the value of the security and the market price would instantly reflect the content of that piece of new information. In this market, it would not be possible for an individual to have the ex-ante expectation of being able to make a profit from investing in any security that is greater than the return given by the market as a whole after an allowance has been made for the riskiness of the investment undertaken.

However, given the fact that the universe of relevant information is extremely vast, students of stockmarkets obviously would differ as to how much of the available information the price of a security reflects. To allow for this difference of opinion, in the same paper Fama also laid down the concept of defining market efficiency in three increasingly efficient forms; namely the Weak, the Semi-Strong and the Strong. Under this concept, the successive form of the efficient market would "fully reflect" a bigger subset of the information universe. In the Weak Form Efficient Market, the information subset the security prices are said to "fully reflect" is that which is related to the historical market data on the



securities. Under the Semi-Strong Efficient Market, the information subset which is reflected in the prices would be that which is "publicly available". While under the Strong Form Efficient Market, the information subset that is reflected in the prices would be that which is available only to ".....investors and groups (that) have monopolistic access to any information (that is) relevant to price formation.....". Although, it is not explicitly stated, it is generally accepted that the subset of information which is reflected by a weak form market would constitute part of the subset of information reflected by the semi-strong form. In turn, the subset of information reflected by the semi-strong market constitutes part of the subset of information reflected by the strong form market. Thus a market that is efficient in the semi-strong form must ipso facto be efficient in the weak form and a market which is efficient in the strong form must also be efficient in the other two forms. However, real life social phenomena are seldom so clearcut. As will be shown later, this unstated implication gives rise to considerable problems for proponents of EMH.

Fama's schema of market efficiency quickly gained wide acceptance since its publication and has been adopted by almost all workers in the field. Since 1970, research papers have ranged widely over the whole universe of the stockmarket information system, seeking to determine the boundary of market efficiency. In the 15 years since the paper was published, the main area of contention between the proponents and opponents of EMH has narrowed considerably (at the very least this applies to researchers in the US, Britain and Australia). It is now generally accepted by most workers in this field that the market, insofar as it is possible to design workable tests, is probably reasonably efficient in the weak form. It has also been accepted that the market is most probably not efficient in the strong form. (Evidence in support of these statements will be quoted in Chapters Three and Four.) The main area of contention between the opposing sides of the EMH debate is therefore now concentrated in the semi-strong area. However, even within this much narrower area of informational efficiency, there is still a great deal of disagreement.

Perhaps it is not surprising that the vast majority of professional investors, financial analysts, portfolio managers and stockbrokers find the idea of EMH unacceptable. (For the rest of the dissertation the short form "EMH" is taken to mean the semi-strong form of



efficient market hypothesis, unless otherwise stated.) Apart from anything else, the EMH, in its current form, assigns no role for professional investment managers and analysts. If one were to accept the main tenet of EMH in this form, one would be compelled to admit that the profession of investment management is largely superfluous. The logical way for non-insiders to invest in a semi-strong efficient market would be to invest in a wide portfolio of stocks and totally refrain from trading. One's return would then be determined by the market according to the level of risk one is willing to undertake. However, if one were to accept that not all professional objections to EMH need arise as a result of self-interest, the general consensus that is found among the over 15,000 financial analysts (this is for the US alone) and probably an even greater number of portfolio managers and brokers is very compelling. While it is not scientific, these professional investors are generally in agreement that in their professional capacity, they continually come across evidence of inefficiencies such that they find EMH go against what their senses tell them.

The surprising thing is that many academics are not convinced either by the arguments and evidence mustered by the EMH proponents. They continue to unearth evidence indicating that there exists certain inefficiencies within what many believe to be an efficient market. Until today therefore, a neutral observer may be driven to come to the same conclusion as Kuehner and Renwick (1980) that ".....the jury must render the identical verdict for both sides: 'SCOTCH VERDICT - NOT PROVED'."

At present, the stockmarket can still be said to be something of an enigma in terms of informational efficiency. While there is a huge body of evidence providing proof that the stockmarket is efficient in the semi-strong form, there is also another body of evidence showing that it may not be that efficient after all. An intending worker in this field faces the difficult task of bringing the two sides of the debate together and trying to make some sense of it all, mindful of the enormous amount of effort that has been put in before him. It would be unrealistic to hope that a single worker can do that much to resolve the Great Debate. But it is hoped that the fresh approach which is proposed may bring some unexpected insights to the problem. This thesis will attempt to show that there is possibly a middle ground where both sides of the EMH debate can claim to be right in their own ways.

In the next section, an attempt will be made to examine some of the more important characteristics of the current state of EMH research in all three forms and how these characteristics can and do give rise to severe problems for the intending researchers in this field. It is also hoped that some lights will be thrown on why the proponents of EMH have met many difficulties in gaining acceptance for their idea.

### 1.3 - Important Characteristics of Stockmarket Research

Stockmarket research is unique in that it has a combination of characteristics which creates many problems for the workers in this area. These important characteristics are :-

- (1) The lack of a strong theoretical foundation on how informational efficiency is achieved;
- (2) The lack of a clearly defined set of conditions and parameters for efficiency; and
- (3) The untestability of EMH in terms of its environment and methods.

Each of these characteristics and the problems which can arise will be examined in this section.

#### 1.3.1 - THE LACK OF A STRONG THEORETICAL FOUNDATION IN STOCKMARKET RESEARCH

In the world of science, there is no rigid rule as to the necessity of having a pre-existing theoretical model before tests on a hypothesis governing the behavior of a certain phenomenon can be carried out. A hypothesis governing a certain behavior can be laid down even before the theoretical model governing the behavior has been postulated. The EMH can be said to belong to this class of hypotheses, for until now, there is no rigorous theoretical model which can explain such efficiency in the stockmarket.

The non-existence of a firm theoretical foundation does not

necessarily mean that a particular hypothesis is unprovable. What it does mean is that the tests which have been carried out to date to prove the validity of EMH are empirical tests. Such tests are likely to be regarded with much greater scepticism by workers in the field than tests which are based on a widely accepted theoretical foundation. What it also means is that the testers of that hypothesis have to be very much more rigorous in their tests. In addition, if any unexplained anomalies are uncovered when the phenomenon is being tested, it would mean that the hypothesis would be on very weak ground.

How then does the lack of a firm theoretical foundation give rise to problems for testers who are seeking to uphold the main tenets of EMH?

#### The Lack of a Model on How Informational Efficiency is Attained

The first problem relates to the lack of a model which can explain the mechanism of achieving informational efficiency in the face of a great diversity in the amount of information generated by each type of shares and the lack of symmetry in the possession and understanding of information by market participants. As will be shown later, it is generally accepted that the stockmarkets of the West are probably not hyperefficient. This being the case, the semi-strong form of efficient market is usually the one that is hypothesised. If this form of EMH is valid, what it means is that there exists a mechanism by which all relevant information regarding all the stocks in the market which is in the "public domain" is fully digested by the "market" and an equilibrium price which represents the best possible estimate of the future price of each and every stock in the market is arrived at. In order to do so, the market will have to act as if it is omniscient. However, until now, the question of how the market achieves such omniscience has not been answered. Furthermore, to achieve omniscience in the face of the great diversities in terms of participants and stocks is even more difficult to explain. The next subsection will examine these diversities in greater detail.

First, the range of participants in the market varies enormously from the professionals who do nothing else but immerse themselves totally in stockmarket research to the proverbial "little old lady from Kalamazoo (or Pontypridd)". The cost of access and understanding the available public information is manifestly not the same for the two groups of investors given above.

It could well be argued by some people that, in the West, particularly in the US, because there are a great many financial analysts whose works are well publicised, a great many journals and newspapers on sale on the subject of investment as well as a long history of share investment, the difference in the cost of access may be too small to make a difference. However, in a very different market like the Malaysian's, one can probably hypothesise that the gulf between the professionals and the "small timers" is very much larger. (As an example of the general ignorance of the small timers in Malaysia, it is the belief of this writer (and other professionals in the field) that most of them do not realise there is a big difference between overall earnings growth of a firm and its per share earnings growth. As a result, firms engaging in takeover "games" are as highly valued as firms with true, high internally generated growth rate.)

If we were to leave aside the problem of definition of "public information" for the moment; an efficient market, wherever it is, would require the low cost producers of information to act in exactly the same way as the high cost producers or there must exist a mechanism for "telegraphing" the intentions of the low cost producers to the high cost producers. As will be shown later on, it is doubtful that the low cost producers would not act on their advantage or that the telegraphing mechanism can act with instantaneous effect.

Secondly, the stocks which make up the market are not homogeneous. In a market as complex as that of NYSE or LSE, there are a great number of stocks which differ greatly in the amount of information each generates and the amount of information which is taken in and fully understood by the market participants. The amount of effort expended by the market participants to collect and understand the information generated would be dependent on the amount of perceived utility that the participants can expect to gain. Given that nowadays, most of the participants are institutions and professionals, it can be expected that they would be much more interested in the larger of the listed firms as well as firms which are currently in vogue or those which are making a new issue of one kind or another. If the price of a stock should reflect the current level of understanding of the available information on it, this would imply that it is the stocks which are more "popular" with the market participants that are likely to be more efficiently priced (unless it can be argued that the threshold of informational knowledge required for efficient pricing

is very low, so low that all listed companies do cross that threshold). Again, it would probably be rash to so postulate.

Even if the threshold of efficiency in terms of public information is very low, there is still the problem of the professional investors being able to glean additional information from the vast pool of information in a way that is not feasible for the small investors. This is the so-called "mosaic effect" whereby a person having an overall view of the information would be able to gather additional information not available to those who only have the smaller segments of the information.

**The Lack of a Model of the Stockmarket System** The second problem relates to the nature of the stockmarket. Is it a truly free market in the economic sense or is it controlled by a limited number of participants oligopolistically or is it somewhere between the two extremes ? Or it could be that certain sectors of the market approaches the ideal free market form while parts of it are oligopolistically controlled (oligopolistically controlled not in the active sense but in the sense that there are only a limited number of investors actually taking part in this sector of the market). If, as it is likely, the market resembles the latter case to some extent, then the pricing of the stocks in some sectors is less likely to be efficient. As will be shown later, two of the most difficult to comprehend anomalies in the stockmarket are : (1) The Small Firm Effect; and (2) The Closed End Investment Trust Paradox (as they are known by the popular financial press). It is possible that these two anomalies are the result of limited participation in these sectors of the market and that those who have access to these sectors may be disinclined to trade or may even be taking advantage of their position.

Given such a complex situation, although it is not necessary to have a theoretical model which explains the working of an efficient market, it would help the case of EMH enormously if there exists a model which could provide the theoretical underpinning as well as explaining some of the anomalies that have been unearthed. In the recent past, several attempts have been made to design models that can explain market efficiency in the face of such diversity in corporate disclosure and wide asymmetry in terms of the economic cost of being fully informed. As will be shown in Chapter Four, none of these models are particularly convincing. Furthermore, these models



cannot explain all of these anomalies; anomalies which seem to indicate that the market cannot be totally efficient. By contrast, those models which allow for some degree of inefficiency appear to have greater explanatory power.

### 1.3.2 - THE LACK OF A CLEARLY DEFINED SET OF CONDITIONS NECESSARY FOR MARKET EFFICIENCY

For obvious reasons, it is very risky to hypothesise that all securities markets are efficient. Security markets do differ a great deal in their make up. It has been long accepted that in order for a market to be efficient, it must meet certain basic requirements. Black, Fama, Lorie and Francis, among others, have set forth the various requirements for an efficient market. Kuehner (1975) summarised these requirements into the following five conditions:-

- (1) Effective flow of (public) information;
- (2) Fully rational investors;
- (3) Rapid price change to new information;
- (4) Low transaction cost; and
- (5) Continuous trading.

However, the exact definition of the above conditions for an efficient market has not been clearly stated, nor has it been made clear in what ways the efficiency of a market would be affected if it does not fully meet these requirements. As with other aspects of the efficiency debate, situations tended to be seen in a black-or-white manner. There had been few attempts made to allow for deviations from the theoretical ideal. This has led to a situation whereby the researchers have to interpret the wording of the hypothesis in their own ways. Tests of market efficiency would be carried out based on the testers' own definition of the various parameters tested as well as their own choice of conditions under which the tests are carried out. Some researchers then proceed to offer the results of such tests as evidence of universal market efficiency or inefficiency. A passage taken from the book of Granger and Morgenstern (1970) quoted below is illustrative of such deterministic writing:-

"It is convenient to list the principal common beliefs (of non-believers of EMH) and to state our subsequent findings as far as they relate to these beliefs:-

- (1) There are cyclical and non-cyclical stocks: disproved (Chapter Four)
- (2) There are seasonal variations in stock prices e.g. there is "summer rise", yearend rise" etc.: disproved (Chapter Three and Four)
- (3) Certain stock movements lead to other stock movements: disproved (Chapter Nine)
- (4) Stock market price cycles lead general economic developments.....:disproved in general (Section 5.3)
- (5) Stock prices can be predicted from "technical analysis" of price charts: disproved as far as all currently used (linear) techniques are concerned"

As will be shown in later chapters of this dissertation, many of the recent papers seem to indicate that a great deal of the so-called "conclusive evidence" of market efficiency turn out to be nothing of the sort. It is hardly surprising that given the above approach, different groups of researchers are continually in disagreement with others.

The next subsection will take a closer look at the first three of the above stated basic requirements for market efficiency and how they can lead to interpretational problems for tests of efficiency. It will also take a look at the problem of extending the efficient market concept to markets which do not fully meet these preconditions.

#### (A) Definitional Problems of the Conditions for Efficiency

(a) Definition of " Effective Flow of Public Information" is Ambiguous The EMH requires all public information on the stock market to be rapidly disseminated and understood by all the market participants. By "public information", this is generally taken to mean information that is available to any member of the public or is published in a widely distributed source; that is, information that is in the "public domain". In the US, this is usually taken to mean information that is published in, for example, the Wall Street Journal. There is little doubt that this information is available to the investment professionals at very low cost. But what about the small time investors? Can they get access to this information with the same cost and at the same time?

Furthermore, there are sources of public information other than the newspapers, for example the information produced by investment research houses and broker firms. It is not clear whether this type of information can be considered public information or not. Since this type of information is available to any one who asks for it or can pay a small price for, it can be regarded as public information. Can one seriously postulate that this type of information is truly available to all participants at the same cost in terms of effort and time?

If the answer to the above two questions is both "no", then it must be admitted that so-called public information is not always equally available to all market participants. Would unequal access, hence dissimilar cost of information, lead to inefficiency in the market? We can draw some conclusion from the work carried out in testing for the strong form of market efficiency.

The work of Pratt and DeVere (1968) and Jaffe (1974) have shown that non-public information can have considerable utilities for those who have access to it. It would seem that unequal access to public information by different market participants is, in essence, the same as some of the participants having access to non-public information. If there is unequal access, it would seem that the market cannot be completely efficient with regard to public information unless it can be conclusively shown that access to information per se is not essential to attaining market efficiency. But there is more to the problem of public information than that. The work of Joy, Litzenberger and McEnally (1972) (unanticipated earnings changes), Chant (1980) (money supply figures as price forecaster) and Brown and Rozeff (1976) (Value Line earnings forecast) have shown that even what many would regard as common public information can provide opportunities for obtaining abnormal profit.

Evidence so far seems to indicate that "public information" may not be a black-or-white issue. That is, information need not be either public or non-public but they can be more or less public. It would not be possible to define exactly the concept of "public information" and the speed of its dissemination. Two pieces of information, both equally "public" by traditional standards may provide different utility in the hand of different participants. It would seem to be unduly deterministic if one were to infer overall public information



efficiency based on the results of a test on a single type of information.

(b) Universal Rationality Of the Market Participants Is In Doubt

Francis (1972) defines rational investors as investors who "are able to recognise efficient assets so that they will want to invest their money where it is needed most- that is assets with relatively high return.". The required level of rationality that is embodied in that statement is far greater than what it seems at first glance because the determination of return from stocks is not straightforward. The return one can expect from stock investments has to be modified to allow for risk, different timing of return and the effect of inflation on different stocks as well as alternative investment vehicles. These modifications are obviously extremely difficult to carry out and it would not be surprising if different classes of market participants were to come to different conclusions as to what constitutes the rational action to be taken in a given situation. If, for some reason, the bulk of the market participants were to be collectively biased in their judgement of what constitutes the rational action to take, it would be possible for the rest of the market participants to take advantage of such irrationality.

There appears to be some evidence that such irrationality does exist and that the market as a whole may even go through periods of inefficiency when it could vastly under or over value a class of stocks. This has been remarked upon by wellknown writers such as Baumol and Malkiel as well as numerous popular fundamentalist writers. Among possible evidence of lack of rationality is the poor performance of the stockmarket during periods of inflation (Modigliani and Cohn 1979); and the small firm effect (Reinganum 1982 and others). These anomalies will be examined in detail in Chapters Three and Four and the next subsection will only briefly discuss how the first of these anomalies could perhaps be explained by the existence of less than perfect rationality on the part of the market.

If one were to examine the efficiency of the stockmarket in terms of its valuation of stocks relative to their earning capacity, one would find that over the very long run, say, 20 years or more, the stockmarket is efficient (for example, the S & P study quoted by Lorie and Hamilton (1973)) for it is unlikely that a security can be mispriced for such a long period of time. On the other hand, the picture for the short and medium term is far from clear. Many papers

have been published to show that the earnings series of firms are probably best described as being close to submartingale processes (e.g. work of Lintner and Glauber (1967)). However, several tests of market efficiency do show that there is good correlation between price and earnings over 1-2 years (e.g. the work Beaver and Morse (1978)). This seems to imply that even if the earnings follow a random process, this does not necessarily make it impossible to be predicted. However, such ability to predict does not lead to abnormal profit because lead time provided is short or even negative (that is the price move downward in anticipation of an earnings decline). Thus the market can be said to be efficient because the information is reflected in the price before or shortly after the earnings figures become public information.

The picture of efficiency is less clear over the longer term. Can the market be considered as efficient in the face of counter evidence of the existence of superior professional investors as evidenced by the superiority of the Value Line ranking (Black (1971)) as a predictive tool? Could it be that the Value Line Corporation and other superior investors have very different time horizons compared with that of the typical market participants? It is a well known fact that most investment analysts and other well publicised investment professionals have a short time horizon. There are seldom any published earnings forecasts for beyond two years and the typical professional investors are said by many well known writers to be much more concerned with the short term (e.g. Dreman (1977)). This being so, it is possible that the poor correlation between medium and long term prices and current PER is due not so much to the non-predictability of long term earnings figures (hence the future market prices) but more due to the inability and/or the disinclination of a majority of the professional investors to look beyond the short term. It is notable that all four superior investors mentioned in Seligman's article (1983) (Buffet, Munger, Ruane and Schloss) as well as the Value Line Corporation are self-professed followers of the investment philosophy of Graham which stresses, among other things, the necessity to hold purchases for a long period. While the success of the investors mentioned in Seligman's article cannot be taken as rigorous evidence of market inefficiency, the recent direct test carried out by Oppenheimer and Schlarbaum (1981) on Graham's investment strategy seems to indicate that there is probably some truth in this assertion. It is possible that they are all exploiting the irrational preoccupation of the

vast majority of the market participants with the short term.

(c) The Definition of "Rapid Price Change" is Uncertain In order for the market to be efficient, the price change on the receipt of a piece of new information has to be very rapid such that the more knowledgeable investors cannot take advantage of their proximity to the market. There is little doubt that in terms of large wellknown companies, such adjustments can be very rapid indeed. As an example of such rapid price changes, the shares of both Texas Instruments and Digital Equipment dropped by over one third in value within three days of their respective announcements of bad news in June and October 1983. However, when the information released is about smaller companies and/or dealing with lesser aspects of the corporate performance, would the adjustment be just as rapid? The work of Kaplan and Roll (1973) and Brown (1978) seem to indicate that the rate of adjustment is low enough for abnormal profit to be made. Thus the traditional assumption that prices adjust rapidly to new information may be conditional on the type of information received.

#### (B) The Applicability Of EMH At Different Time And Place

The EMH is largely a product of the US investment environment of the Seventies. There is little doubt that it has been an extremely useful tool for understanding the overall behavior of the US stockmarket and that many of its basic assumptions are probably correct. The US market of the Seventies can be characterised by being mature, large, complex, very well researched, with excellent corporate disclosure and is at the same time well controlled and policed. There are many well informed and sophisticated investors and many highly intelligent and astute commentators. It is likely that it is very close to the ideal conditions for an efficient market laid down earlier. It is probable that these characteristics have some effect on it being as efficient as it is. However, we have seen that even in the US, the market can differ from the ideal conditions for efficiency. What about markets with conditions which differ considerably more from this ideal picture?

There are many other stockmarkets in the world that are very different from the US market in term of meeting these requirements. Indeed, judging by the writing of Galbraith(1954) the US market fifty to sixty years ago was very different from what it is now. If meeting these requirements results in a market being more efficient, how

would deviations from these requirements affect the efficiency of the market? As will be elaborated in Chapter Four, work carried out in less developed markets (including the European and Canadian markets) shows that there are greater signs of inefficiency. While there has not been much work in the English language on markets which are even less well developed than the European markets, those published so far show that this area is likely to be fruitful ground for further intensive research.

The Malaysian market, being just twenty five years old, is obviously not as well developed as the US market. If it fits into the pattern of the other less developed markets, it would be very useful ground for research. A comparative study against the best developed markets could yield interesting results in terms of the necessary conditions for achieving efficiency and could perhaps throw some light on the reasons for the existence of inefficiency in an otherwise fairly efficient market. (Chapter Two provides a short descriptive history of the Malaysian stockmarket as well as a contrasting study of certain of its characteristics with those of the US and UK markets).

From this short discussion we have seen that there are a considerable number of ambiguities surrounding the conditions generally specified for an efficient market. Even the most advanced market can fail to meet some of these conditions in some parts let alone the less developed market. While failure to meet all the preconditions does not necessarily mean the existence of exploitable inefficiencies as Fama rightly pointed out in his paper of 1970, it does mean that once again, researchers have to be very much more careful in making assertions about overall market efficiency in the light of such evidence.

### 1.3.3 - THE "UNTESTABILITY" OF EMH IN TERMS OF A CONTROLLED ENVIRONMENT AND OF CERTAIN PRACTITIONERS' METHODS

#### (A) The Impossibility Of Having A Controlled Environment For EMH Tests

If a stockmarket is efficient, it means that the current price of a security is the best possible estimate of the risk adjusted present value of its future price based on the current available information. This means that the ex-post price should come from the same

probability distribution as the ex-ante price. However, this is very difficult to test for two reasons. First, unlike some other social phenomena, it is impossible to carry out controlled experiments on market efficiency, however small scaled the experiment may be.

The second problem is that it is generally argued that the distribution of stock prices does not conform to a distribution for which the characteristics are well defined. This being so, it would be difficult (if not impossible) to prove that any extreme movements of stock prices that there are were caused by abnormal factors. There is therefore no way, after the event, to determine whether big variations in stock prices are caused by market inefficiency or not. It is possible for the big variations to be caused by the ex-post prices being located at the extreme end of the probability distribution.

Hitherto, tests on market efficiency therefore have relied on indirect tests. These tests seek to infer inefficiency or otherwise by such methods as observing the stock price series surrounding a critical event (e.g. stock split) or the comparison of the expected return on the stockmarket with the return derived from a particular stock investment method (e.g. quarterly earnings used for the prediction of annual earnings). In either case, efficiency or inefficiency is then inferred based on the deviation from the expected after the appropriate adjustment for risk has been made. Such inferences are obviously very risky since they are very much dependent on the assumptions made about what is expected, the risk adjustment made as well as assumptions regarding the validity of the methodology of the tests. A good example of how wrong inferences can lead to wrong conclusions regarding market efficiency is the test originally carried out to prove the strong form of market efficiency by Jensen (1968). Jensen's conclusion depended on the poor risk adjusted performance shown by mutual funds as proof that the market is highly efficient. His test was based on the assumption that the mutual funds with all their expertise and wealth of research ought be able to show better than average return if the market is in any way inefficient. However, as pointed out by later writers (e.g. Malkiel (1975) and Dreman (1977)), there is substantial evidence that the mutual funds may well be collectively biased in their stock selection and that they could also be too big a factor in the market to be able to trade profitably without telegraphing their intention to the rest of the market. In this case therefore, poorer than expected return is no indication of



efficiency or inefficiency.

Furthermore, such indirect tests have to be based on the statistical concept of significance. In cases where the significance is marginal, the conclusion reached would to some extent depend on the personal bias of the tester. As Jones Tweedie and Whittington pointed out in a "Reply" to a comment to their paper (1976), statistical tests are not symmetrical tests. The fact that a test fails to uphold the null hypothesis cannot be taken to imply that the opposite hypothesis would be supported.

It is also notable that many of the tests so far carried out have used the same source of data, that is, the CRSP tapes in Chicago. The data held there are of very long duration and most researchers have relied on tests carried out over long period of time in order to secure the highest level of statistical significance. Given the fact that a sociological phenomenon is being observed, it is questionable whether it is necessary or even advisable to run tests on data covering long periods of time. If the market's behavior is not static but slowly evolving, its characteristics may have changed a great deal over the duration of the test. These types of changes may produce very "fuzzy" results in statistical tests such that either different or no conclusion can be drawn. As an example of this, Allvine and O'Neill (1980) arrived at a very different conclusion regarding the existence of long term cycles compared with Granger and Morgenstern (1970) in carrying out spectral analysis on the prices of NYSE stocks. Their different conclusion can be partly attributable to the incorporation of a phase shift in 1960 and extending the test to 1980.

#### (B)The "Untestability" Of EMH In Terms Of Some Practitioners' Methods

The nature of statistical testing is such that they have to be simple with few variables. As the number of variables increases, the tests have to be replicated an ever greater number of times. While in the US or the UK it is possible to obtain enough data to replicate the test many times, such abundance of data is not obtainable in all markets. In certain markets, the researcher has to work with a fairly small number of stocks. However, it is very difficult to make simple straightforward tests to resemble exactly methods (even very simple methods) commonly used by investors. This statement applies to methods commonly employed by both technicians and fundamentalists,

although it is more so for the technicians' methods.

In addition to the problem of keeping the test simple, there is also the problem that some of the practitioners' methods are not amenable to being tested. One of the most important percepts of the art of technical analysis is the "trend channel" in which medium term prices are supposed to confine their movements ( This is in accordance with the concept of secondary movements under the Dow Theory (see Edwards and Magee (1966 )). EMH proponents have tried to use serial correlation, run tests and filter rules to show that the trend channel is only a figment of the technicians' imagination. However, each of these tests can only test one particular feature of a trend channel and each of them can only emulate the real life situation in a very crude manner. This is because the characteristics of the secondary cycles under the Dow theory are not specifically defined. The secondary price cycles have no fixed cycle length (they are supposed to vary between 6 weeks and 6 months). The slope of the secondary trend channel is also not constant nor is the width of the trend channel known. Lastly, the number of cycles per uptrend or downtrend is not known in advance either. It is difficult to conceive of a statistical test that can make allowance for all these features. It is not surprising that even a strong supporter of EMH as Fama was moved to remark, " The simple linear relationships that underlie serial correlation models are much too unsophisticated to identify the complicated 'patterns' that 'chartists' see in stock prices. Similarly run tests are far too rigid in determining the duration of the upward and downward movements." ( Fama and Blume (1966)).

Not only are the technicians' methods difficult to replicate, the methods commonly employed by fundamentalists are also difficult to test. The fundamentalist approach to investment as espoused by Graham and his supporters holds in essence that all stocks have an "intrinsic value" at any one time and that the market price wanders randomly about the intrinsic value. If a person can derive the intrinsic value of a stock, he should purchase it whenever its market price falls considerably below its intrinsic value and hold it until its market price is considerably above its intrinsic value ( as it must eventually do since the price movements are random and bounded). If one willing to wait long enough, the price will get above the intrinsic value at which time he can dispose of it at a profit. Again, it is probably impossible to test this theory. The

determination of intrinsic value is very much a subjective event since it is derived from several measures rather than a unified approach. The determination of the correct purchase and sales points is similarly highly subjective. The length of time for which the stocks have to be held was never clearly stated by Graham, although a period of several years was frequently mentioned as a possibility. Given these difficulties, it is not surprising that few attempts had been made to test this long standing theory in spite of the fact that both Graham himself and a number of his followers have achieved well documented success with his method. The one better known test on Graham's method (Oppenheimer and Schlarbaum (1981)) is based on the simplified method as described in Graham (1973) rather than that in Graham, Dodd and Cottle (1962).

#### 1.3.4 - CONCLUDING REMARKS ON SECTION 1.3

The EMH controversy, inspite of thirty years of intense research is still far from resolved. An attempt has been made in this section of the dissertation to show some of the reasons which are believed to have created such difficulties for researchers seeking to prove this hypothesis. We have seen that given the lack of a strong theoretical foundation, the lack of unanimity concerning the exact definition of the conditions for efficiency and the difficulty of designing workable tests, the proponents and opponents of EMH are still very far apart. It is likely that so long as these conditions persist, the controversy will remain. This thesis holds the opinion that to a large extent, the controversy is due to the strongly held views and position of many researchers on both sides of the debate. It is possible that the phenomenon may not be one which is resolvable on a black-or-white basis. It is also possible that an approach which tries to adopt a middle ground between the two sides of the controversy may yield better result. In the next section of this chapter, an attempt will be made to lay down the objectives of this study and how this writer plans to achieve them.

#### 1.4 - Objectives of the Research

As shown in the last section, EMH research is fraught with enormous



difficulties, especially for the proponents of efficiency given the "one black swan is sufficient to falsify the hypothesis that all swans are white" principle. Some of the proponents of efficiency seek to strengthen their position by further research hoping that more complex research methodologies, bigger bodies of data or the discovery of risk misspecifications would demolish the arguments mustered by their opponents. However, each of these research directions can give rise to further problems. More and more complex research methodologies have a tendency to further divorce the academics from the real world of investment. Bigger bodies of data do not necessarily lead to more clearcut results. Besides, the vast majority of research carried out in the US rely on two sets of tapes (CRSP and Compustats); it is doubtful if there is that much untested data left. Nor can all anomalies be explained by reason of risk misspecification (for example, the Monday Effect and the Yearend Rally) and some of the risk factors proposed are arguably not risks but are inbuilt bias (for example, unexpected inflation can be regarded as a risk factor and if included would remove the mispricing of stocks during period of high inflation but some fundamentalists could well argue that this "risk" is more the result of incompetence among the financial analysts).

However, exhaustive and meticulous research over the last ten years or so does not appear to have moved forward the position of the efficient market proponents by any great extent. Based on the reasonable assumption that a market should become more efficient as it develops, if it has been so difficult to show conclusively that the US market is efficient, it must be considerably more difficult to do so for a less developed market like Malaysia's. This has led this writer to the conclusion that it is possible that the original assumptions underlying the EMH may be fragile assumptions and the efficient market model as proposed by Fama may prove to be far too simplistic for the real world situation, especially if one were to take into consideration the existence of markets at different stages of development. What is required may be a model (a new one or a development of the Fama model) which takes into account all the findings of the research since Fama made his original proposal and one which has wider application to all types of markets. A study can then be carried out to examine the predictive power of this model to a real life situation. However, given the fact that the model would have been developed using the research findings from the US, there is hardly any point in testing it further in the US. The logical place

to test it would be in a market which has not yet been studied and one which is also very different from the US in order to test the wider applicability of the proposed model.

The Malaysian market fits the above description. In addition, it is reasonably small in size and have a fairly short history. It is therefore ideal in the context of a doctoral thesis.

The main objective of this research, stated very broadly, is to propose an adaptation of the traditional model of the information/security pricing system so that it can be used as the basis for attempting to throw some light, to the extent possible, on the current controversy surrounding the EMH issue. This model will then be tested on a new body of data from a very different market. Given the complexity and the ambiguity surrounding this issue, this may seem to be an overambitious objective at first glance. However, it must be pointed out that this objective represents the final rather than the sole objective of the study. Before an attempt can be made to tackle this objective, the study first requires the attainment of three subsidiary objectives. The objectives to be attained in this study can be considered to be each on a different level in term of abstraction and difficulty. The study therefore proceeds from the attainment of one objective to the next, each step building upon the successful accomplishment of the previous step. The four objectives are:-

- (1) To carry out an analysis of the characteristics of the Malaysian stockmarket;
- (2) To carry out an analysis of the efficiency of the Malaysian stock market in respect of a wide range of information;
- (3) To compare the efficiency of the Malaysian stockmarket vis a vis the American and British stockmarkets; and
- (4) To examine the applicability of the traditional model of market efficiency in the light of the above findings and to suggest possible modifications/extensions to the traditional model of informational efficiency.

The rest of this section will discuss the reasons for pursuing each of these objectives as well as providing a detailed description of each objective.

#### 1.4.1 - AN ANALYSIS OF THE MALAYSIAN STOCKMARKET

In the traditional model of an efficient market, the environment and the participants of a market are assigned no specific role and their contribution to market efficiency is not stated. However, this thesis takes the position that the nature of the market and its participants could possibly have important parts to play in the attainment of its efficiency. The traditional model of EMH assumes that the market is efficient because of the effective flow of information to the fully rational investors who will instantly bid up or down the prices to the optimum level. In what way this efficiency is achieved is not stated. Nor does this model allow for the existence of less than ideal market conditions and state what would happen in that eventuality.

The modification/extension to the model of market efficiency that will be proposed in this thesis rests on the not unreasonable assumption that efficiency depends on various variables connected with information availability and the correct interpretation of such information. Markets in the world therefore differ in their individual efficiency because they differ in terms of these variables. While no prior research has been carried out to specifically link any of these variables directly to a certain type of informational efficiency, it is possible to develop some idea of the factors which can lead to greater efficiency by examining the characteristics of the US market in the context of the wide spectrum of efficiency tests that had been carried out.

Take for instance, the situation in which the US stockmarket treats the news of stock splits efficiently (Fama et al (1969)) but not the news of earnings forecast error (Joy et al (1977)). We can probably say with some confidence that it is efficient in the former case because the vast majority of the investors and market professionals understand the meaning of a stock split. But in the latter case, it is not unreasonable to conclude that it is not so efficient because fewer people take the trouble of either computing or compiling the expected earnings figures and then compare them with the published results. This situation is not at all surprising because it does not take a very high level of investor literacy to understand that stock splits in themselves do not create value but it requires a far higher level of sophistication to make sense of earnings forecasts and to speedily take action as soon as the actual earnings figures are

released.

In the US and the UK, hundreds of tests had been carried out to study the efficiency of the markets in their treatment of a huge range of information. Combining our knowledge of the characteristics of these markets in term of its information system, participants and the financial literacy of the participants with an analysis of the markets' behavior in those tests, we can develop some a priori conclusions regarding what are the factors which are likely to lead to greater efficiency. The following is a non-exhaustive list of these factors, most of which are concerned with the degree of sophistication of the investors and/or the availability of information:-

- The proportions of professional versus private investors;
- The quantity and quality of investment publications;
- The average financial literacy of the market participants;
- The degree of control of equity by corporate insiders;
- The level of disclosure and the quality of the corporate annual reports; and
- The number of traders and the level of trading activity in the market

If our prior analysis is correct, the more developed or sophisticated a market is along each of these dimensions, the more efficient we would expect it to be. It is true to say that most of these factors do not lend themselves very well to being measured. Some of them would be difficult to quantify (for example, financial literacy). While it is not possible to provide a quantitative measure of each of these factors, it should be possible to give a qualitative statement on each and/or to measure some of them through the use of surrogates. It is realised that qualitative statements may not be satisfactory in the context of a dissertation. However, it is perhaps important to note that it is not so much that such statements are in any way usable in themselves but that they allow us to compare two different markets and note the differences between them along each dimension.

The first major task of this thesis is then to produce a description of the Malaysian stockmarket along each of the above stated dimensions. This is provided in Chapter Two of the thesis together with some other information on the market. If our hypothesis is correct, it is likely that the Malaysian market would be less efficient than the Western markets. The next step would then be to

attempt to measure the degree of efficiency of the Malaysian market.

#### 1.4.2 - ANALYSIS OF THE EFFICIENCY OF THE MALAYSIAN STOCKMARKET

The main task required under this objective is to analyse the behavior of the Malaysian stockmarket in terms of its efficiency. More specifically, this will involve the analysis of the market's response to certain types of information to discover whether it "reads" these types of information efficiently or not. In the first place, this would involve arriving at a definition of the term "informational efficiency" which is testable. As will be shown in the Chapters Three and Four, the workers in this field of research are gradually moving away from the more rigid definition of informational efficiency as originally laid down by Fama in 1970 towards an approach which was first formally suggested by Beaver in 1981b. This approach is better suited to the type of efficiency to be tested in the thesis. In fact, the model of market efficiency proposed in this thesis is a modification and extension of the Beaverian model.

In brief, Beaver proposed that a market/information system could be said to be efficient in two ways. Either the whole market/information system is efficient, in which case all the information emanating from such a market are correctly "read" and reflected in the price of stocks of that market. Or, only certain 'signals' from this market/information system are correctly read, in which case, the market cannot be said to be efficient overall. Two important features of this model have to be noted here. First, the same market could react to different information in different ways depending on how "difficult" (i.e. difficult in terms of the effort required to uncover and comprehend the information) it is to read each signal. Second, different markets could, conceivably, react to the same information in different ways. The objective of this part of the study is to discover how the Malaysian market reacts to certain types of information (signals).

The choice of signals to be tested is obviously very critical to the results that are likely to be obtained. If the signals to be tested are restricted to very "difficult" signals, the market will give the appearance of being very inefficient and vice versa. Fortunately, the main purpose of this investigation is to afford a comparison with the US and UK markets which have been very well investigated. We can



choose from the results of studies on the reaction of the market to an enormous range of signals which cover a wide spectrum of "difficultness" in terms of dissemination and comprehension.

There are several criteria used for selecting the number and type of signals to be used in the comparison. It is decided to select seven signals, the number being a compromise between comprehensiveness and available resources. The selection of the actual signals is a compromise between making full use of the data which can feasibly be collected and the desire to have a wide range of different types of signals. These seven signals are chosen because, to the degree it is possible to be definite, they are treated efficiently or very efficiently by the US market. The reaction of the Malaysian market to these seven different signals would give a good impression of the overall efficiency of the market as compared with the US market. This work will be described in the next subsection.

#### 1.4.3 - COMPARISON BETWEEN THE US, UK AND MALAYSIAN MARKETS

As has been mentioned earlier, stockmarket efficiency is thought not to be a black or white issue as commonly implied by many published works. If we wish to compare two different markets in term of their efficiency, there is no existing framework for doing so on a graduated basis. In the first place therefore, this study has to organise the concept of efficiency in such a way that some sort of statement can be made in terms of comparative efficiency. As mentioned in the last subsection, stockmarket efficiency can be considered in terms of signal efficiency or overall market efficiency. Since market efficiency is such a complex and nebulous issue under the Beaverian model, it would be logical to compare different markets based on their respective treatment of certain signals.

This study proposes that signal efficiency be thought of in terms of the utility that can be derived by a person who can obtain, correctly interpret and act upon a signal irrespective of the actual market situation (the knowledgeable investor). The smaller the potential for obtaining abnormal gain from that signal in the hand of that knowledgeable investor, the more efficiently is that piece of signal being treated by the market as a whole. In order to have an idea of how much utility a piece of information may have, we must first consider how a piece of information is processed by the market to

derive an efficient price for a stock.

It is possible to think of the process of attaining pricing efficiency as a three staged one. Firstly, the market must produce a piece of information which is of potential benefit to stock valuation and disseminate it throughout the market. Secondly, the market, after having obtained that piece of information, must correctly interpret the meaning of its content. Lastly, after the correct interpretation, the market still has to react speedily to bring the price of the security to the correct level. If the market fails at any of these stages, it would give the appearance of being inefficient in terms of a particular signal. It must be emphasised that this schema is developed as an aid to comparing the efficiency of different markets and it is not meant to be definitive. As can be expected the boundary between any of two adjoining stages is likely to be ambiguous and for certain types of signals, the three stages can be compressed into two. The announcement by a firm that it is filing for Chapter 11 protection under the Bankruptcy Act would be an example of the latter case since the meaning of this piece of news is instantly obvious. The diagram below (Figure 1.1) illustrates the proposed schema.

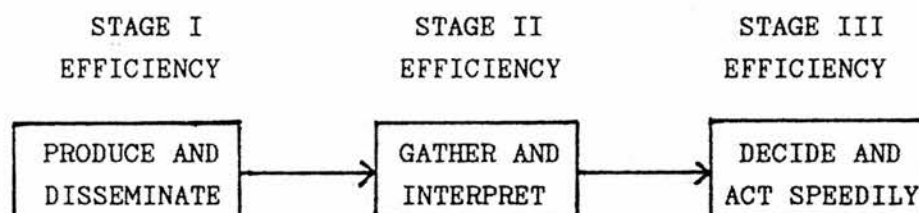


FIGURE 1.1 - DIAGRAM OF PROPOSED SCHEMA FOR SIGNAL EFFICIENCY

Although failure at any of the above three stages would result in the market being regarded as inefficient in terms of a particular signal, there is a qualitative difference in terms of which stage the information-efficient price process fails. Obviously, if a market does not even produce a certain type of information (for example, the non-availability of dividend forecasts for Malaysian companies), it can be said to be very inefficient in terms of that particular signal (compared with the US situation where the IBES consensus forecasts for the larger corporations are widely available). In this case, only those who have private access to that information can profit from it; this means that the utility of that piece of information (if it exists at all) would be enormous.

At the next level, if the market does produce that signal (Stage I Efficiency) but the market as a whole either does not get hold of it or does not appear to interpret it correctly (for example, the meaning of bonus issues may not be fully understood by the market which regards it as a piece of good news). Those who are able to interpret it correctly (i.e. that bonus issues in themselves are of no benefit), would be able to benefit from it. Since presumably, only a small number of people are privy to its true meaning (otherwise the market would have the appearance of being efficient), the signal would still have some utility.

At the next level, if the market is inefficient only in so far as it is tardy in acting after its correct interpretation of that signal (Stage II Efficiency), the faster acting investors will be able to benefit from that signal. In this case, the utility of that piece of information is likely to be smaller. Finally, if the market reacts correctly and speedily to a signal, the utility of that piece of information to anybody would be zero (Stage III Efficiency).

This study will therefore critically examine the Malaysian market's response to each of the selected seven types of signals compared with the US and the UK markets. At the end of the study, it would be possible to give a general statement on the relative efficiency of the Malaysian market. At the same time, it is hoped that with the successful attainment of these three objectives, there is sufficient ground to proceed to the next objective.

#### 1.4.4 - A PROPOSAL TO MODIFY THE FAMA MODEL OF MARKET EFFICIENCY TO SUIT A WIDER RANGE OF MARKETS

This section will introduce a new model of informational efficiency for stockmarkets adapted from the Fama model based on the previous discussions in this chapter and on analysis of existing literature which is described in Chapters Three and Four. The new model differs from the existing, commonly accepted Fama model in its description of the information system and the process of attaining pricing efficiency. The description of the new model will be carried out by contrasting it with the existing model.



#### 1.4.4.1 - DESCRIPTION OF STOCKMARKET INFORMATION SYSTEM

The Fama model of stock market information system is best illustrated graphically in Figure 1.2 below.

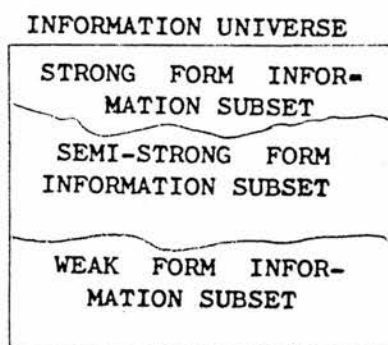


FIG 1.2 : FAMA 'S MODEL OF INFORMATION SYSTEM

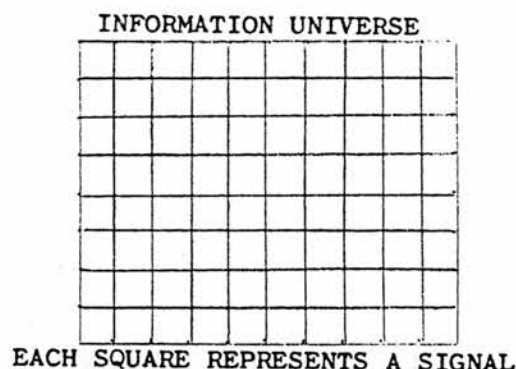


FIG 1.3 : PROPOSED MODEL OF INFORMATION SYSTEM

Under Fama's model, the information that is deemed to contribute to market efficiency is thought of as three "concentric" sets of information. A market is deemed to be respectively weakly, semi-strongly or strongly efficient depending on which set of information the security prices fully reflect. This model gives rise to the following problems when tests are carried out to study market efficiency:-

- (1) The division of the information into three sets and the name given to each is largely arbitrary. There is no real evidence that all historical data are easier to obtain or treated with greater efficiency than other types of public information;
- (2) The definition of each type of information is inexact hence the boundary between two adjoining sets of information is unclear;
- (3) The market can be efficient with regard to what many would think is non-public information and at the same time be inefficient with regard to certain public information; and
- (4) The division of the information universe into three subsets gives rise to the tendency for researchers to think of the market's reaction to a particular type of information as representative of its reaction to the whole class of information.

In order to overcome these difficulties, a new model of the market information system is proposed. The general concept of this model is illustrated graphically in Figure 1.3.

This model which may be called the Mosaic Model does away with the somewhat artificial division of the information into three categories. Instead the model views the information universe within a particular market system as being made up of numerous pieces of information in a mosaic tile pattern. Each of the pieces of information that is available in a particular market would have more or less influence on the price of one or more securities.

The amount of information that is available is different from market to market. There are two major factors determining the amount of information that is available. Firstly, the amount of so-called "public" information is dependent on the legal and institutional environment of corporate disclosure. In a country like the US, the amount of information that is disclosed to the shareholders and authorities like SEC is truly prodigious while the amount disclosed in Malaysia is very much smaller. Secondly, the amount of information available is dependent on the number and quality of financial journalists, research houses, broker firms and the like. The amount and type of information produced by these sources can be very different from that which is disclosed by the listed companies themselves. Again, the availability of this type of information differs greatly from country to country.

However, the available information can be thought of as being hidden to some extent from the investors (even what is thought of as public information). In order to make use of the information, efforts must be made and certain costs incurred. Some of the information is very easy to gather; for example, quarterly corporate earnings figures. Some can be more difficult, for example, inflation adjusted earnings figures. While it may be useful to further classify the information in terms of the cost and difficulty of gathering it, it is doubtful if this is really feasible. Given the enormous number of information pieces available in a market and their diversity, it would be difficult to design a schema wherein all information pieces can be described on the same scale. Secondly, it seems that a particular market does not always behave in the same way. At times, it would work very diligently in a particular area and uncover a lot of information while at the other times, it may ignore this part of the

market. Thus in 1983 and 1984, the personal computer industry was in vogue and the market did produce an enormous amount of data on this industry while at the same time, there was a lot less information on "blue chips" favourites like Polaroid, MMM and Walt Disney. Thus information which requires a lot of effort to obtain is not necessarily less accessible to the investing public.

The cost and accessibility of a particular type of information is probably more a function of the amount of useful information there is in the first place and the effort put in by the various market participants to accumulate it rather than the actual "difficulty" involved in gathering it. The next section will discuss the part played by the market participants in creating, gathering and understanding information.

#### 1.4.4.2 - THE PART PLAYED BY MARKET PARTICIPANTS

The process leading up to the final decision making regarding the sales or purchase of shares is very complex. There are not many investors who do their buying or selling in accordance to the method an adherent of EMH would prescribe. For the vast majority of buyers and sellers, they trade because they believe that the current market price is higher (for the sellers) or lower (for the buyers) than the expected risk adjusted future price. This being so, the enormous amount of information that is available on any one stock has to be digested and distilled into a single piece of information -- the expected future price. This complex process can be broken down into three steps as shown graphically in the diagram below following the schema first developed in Subsection 1.4.3.

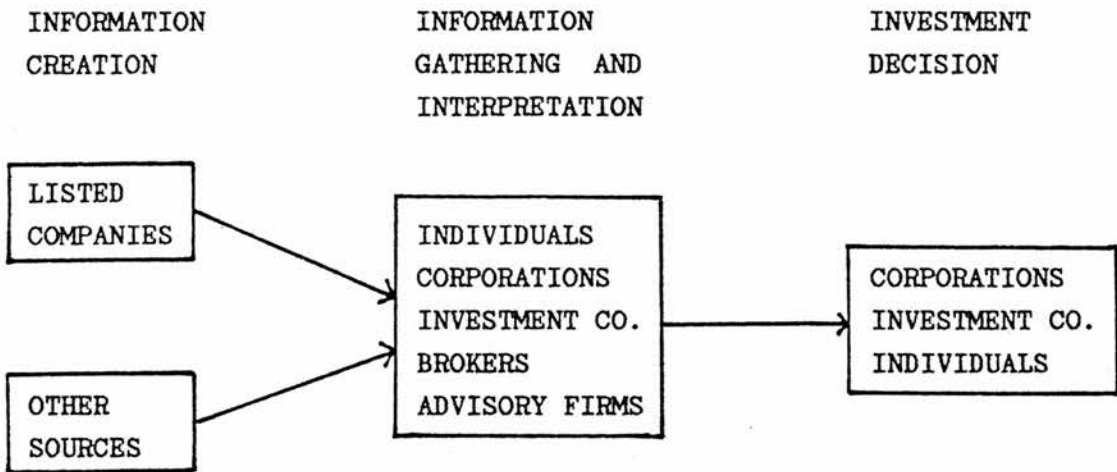


FIGURE 1.4 :PARTICIPANTS AND THE PROCESS OF  
ACHIEVING INFORMATIONAL EFFICIENCY IN INVESTMENT

As can be seen above, the process can be thought of as one of three parts -- Information Creation, Information Gathering and Interpretation and Investment Decision Making. Subsection 1.5.1 will discuss the concept of information creation and this subsection will deal only with the last two stages. These two steps however are not straight forward in that the process can be direct or convoluted, fast or slow depending on the participants involved. The three steps in this process can be undertaken by a single market participant (e.g. a large mutual funds) in which case it would be direct and possibly fast or can be undertaken by a different market participant for each step (e.g. S&P, a broker and a small investor) and hence conceivably slow. For a market to be efficient for one type of signal, there must be a sufficient number of participants who can complete all three steps quickly and correctly. As explained in Section 1.4.3, inefficiency can arise if there is a failure in any of these steps.

Under the model proposed by Fama, no specific role has been assigned to the various market participants in the attainment of efficiency by a particular market. This thesis however, postulates that the informational environment and the participants who make up a market have important influence on the efficiency of the market. For a stock to be efficiently priced, all the knowable information on it must be disseminated to - and be correctly interpreted by - a sufficiently large number of investors or their agents. The US market with its well developed legal and institutional environment and the large

number of information "gatherers" and "interpreters" is likely to be very efficient. However this study takes the position that given the large number of signals available in any securities market and the very large number of disparate participants involved, it is extremely unlikely that every single signal generated by the market can be correctly interpreted and speedily acted upon. For most investors in the US, it is likely that the market will have the appearance of efficiency because they are situated at the tail end of a long chain of events. The typical small investors, relying upon second or third hand information relayed by their brokers, are most unlikely to be able to discover any inefficiency. This does not necessarily mean that the large well endowed mutual funds can perform a lot better. The process of information interpretation under the typical mutual fund environment could lead to group bias (Dreman (1977)) and the typical institutional environment of large mutual funds probably lead to slow decision making as well.

Under this scenario, the participants who are most likely to discover and exploit inefficiencies are the smaller investment trusts or companies run by individuals who can make accurate interpretations of less well popularised information they have unearthed and then act fast on such interpretations.

The Malaysian market however, lacking the institutional and legal setup of the US, has a far smaller number of gatherers and interpreters of the information. If, as hypothesised, they do play an important part in the information efficiency process, the Malaysian market is likely to demonstrate more signs of inefficiency. This hypothesis will be tested in Chapters Seven and Eight of this thesis.

#### 1.4.4.3 - THE MODEL OF STOCKMARKET EFFICIENCY DESCRIBED

The Mosaic Model of market efficiency that is proposed in this study is best described by drawing an analogy with the lithographic printing process. In lithographic printing, colour and tonal variations are achieved by the imprinting of coloured dots of different sizes on the same surface. The overall impression of colour and tones is controlled by the mixture of different coloured dots of different sizes. Thus the impression of grayness can be achieved either by imprinting an overall gray coloured dots or by an admixture of black and white dots. The tone of gray colour can be achieved

either by using a gray ink of the desired tone or by the correct proportion of black to white dots. Market efficiency can be thought of as the overall impression of efficiency of a market as given by the proportion of efficiently treated signals against the inefficiently treated signals.

Thus we can think of black dots on a piece of paper as representing inefficiently treated signals while white dots represent efficiently treated signals. In the most simplistic case, the market can be thought of as either totally efficient or totally inefficient. In the former case, it would be white overall while in the latter case, it would be black overall. However, there are unlikely to be any totally efficient or inefficient markets. The stockmarkets which are found in the real world are likely to form a continuum across the range between the two extremes. The problem of how to describe the relative efficiency of each market arises.

The problem is that the signals are not themselves treated totally efficiently or inefficiently (as explained in Section 1.4.3). That is, the dots themselves need not be black or white but could be different shades of gray. This means in effect that all stockmarkets are likely to give the appearance of grayness of differing shades. In a highly efficient market like the US, the overall impression would be one of very light shades of gray since most of the dots would be white in colour with a scattering of gray and black dots. In contrast, the Malaysian market, if it corresponds with the hypothesis in this study, would give the impression of a darker shade of gray since many of the dots would be black or gray with a scattering of white dots.

Thus when we speak of market efficiency, it is not possible to talk of a market as being "efficient" overall. Its efficiency is one of degree and parts rather than overall. Comparison between different markets can only be carried out qualitatively, and even so such comparisons can only be tentative. Therefore, there can be no universal form of market efficiency. Each market differs in its make up in terms of its legal and institutional environment and the variety, number and quality of the participants. Such qualitative differences would give rise to markets with different degrees of efficiency.



## CHAPTER TWO

### A SHORT HISTORY AND DESCRIPTION OF THE MAIN CHARACTERISTICS OF THE MALAYSIAN AND SINGAPOREAN MARKETS

#### 2.1 - Introduction

In Chapter One of this thesis, it has been pointed out that stock markets of the world can and do differ greatly in their make up and characteristics. It hypothesises that stockmarket efficiency is not an automatic event. It is more likely, so it is hypothesised, that stockmarket efficiency is dependent on the nature of the market and that certain factors are likely to influence the degree of efficiency attained by a particular market. This chapter will attempt to describe some of those characteristics which are thought to be important in affecting the degree of efficiency of the market and will make some conjectures regarding the ex ante expectation of the efficiency of the Malaysian stockmarket. The chapter begins by providing a short descriptive history of the Malaysian stockmarket. It is felt that an understanding of the history of this market will lead to a better understanding of its present characteristics which are likely to be strongly influenced by the past events.

A study of the history of the Malaysian stockmarket cannot avoid mentioning the role played by Singapore, especially in the early years of its development. Until 1957 when the then Malaya achieved its political independence, the social and political administration of the two countries was very much linked. During the time of the British colonial administration, Singapore was regarded as the administrative and commercial hub of the British colonies in the region. Trading and other commercial activities therefore tended to be started in Singapore and then proceeded to spread gradually to the rest of the region. Malaya (as it was then known) was very much regarded as the productive hinterland which existed to support the port and commercial activities of Singapore. It was inevitable that the securities industry started in Singapore, although with time its institutions were to diffuse throughout Malaya as well.

Given the longer history and greater sophistication of the stockmarket participants in Singapore, it is inevitable that almost all the writings that had appeared on the stockmarket were produced by Singaporeans. Hitherto, there had been almost no writings by Malaysians or foreigners specifically on the Malaysian stock market. A study of the characteristics of the local stockmarket would need to rely to a large extent on extrapolating what have been written on the Singapore stockmarket. Even so, much of the writings that had appeared cannot be regarded as being of a serious academic nature. A large part of what is to be reported in this chapter can only be regarded as being more anecdotal in nature.

This chapter is divided into various major sections. The first and the longest is a descriptive history of the nature and organisation of the stockmarket in the two countries. The rest of the chapter will be divided into eight sections, each describing one important characteristic of the market which together are believed to exert some influence on the efficiency of the local stockmarket. The rest of this chapter is therefore divided as follows:-

- 2.2 - THE DEVELOPMENT OF THE MARKETS
- 2.3 - THE GROWTH OF THE MARKETS IN TERMS OF MARKET VALUE
- 2.4 - THE OWNERSHIP AND CONTROL PATTERNS
- 2.5 - THE TRADING VOLUME AND THE VARIABILITY OF VOLUME
- 2.6 - THE NUMBER AND QUALITY OF INVESTMENT PUBLICATIONS, ADVISORY SERVICES AND BROKER FIRMS
- 2.7 - THE DISCLOSURE REQUIREMENTS
- 2.8 - SOME COMMENTS ON THE LOCAL MARKET FROM THE FAR EASTERN ECONOMIC REVIEW
- 2.9 - CONCLUSION

## 2.2 - The Development Of The Local Securities Industry

The history of the local securities industry can be conveniently divided into three parts, the first being its development up to the eve of the Second World War when it was still largely Singapore based dealing in British shares. The second is the period from the end of

the Second World War to June 1973 when the Stock Exchange split into its two component parts. The third is the post June 1973 period to the present time with the separate development of the Malaysian market being a highlight of this period.

### 2.2.1 - THE EARLY YEARS

The history of the earliest years of securities trading in Singapore is very much the history of one single securities firm - Fraser & Co. (Fraser & Co. still exists and is one of the largest broker firms in the Republic today.) This firm was established in 1873 and until the first establishment of a central meeting place by the brokers themselves in 1908 (?), the premises of Fraser & Co. was the meeting place of the local brokers. During these early years, Fraser & Co. dominated the trading to such an extent that it made the market for the rest of the brokers.

The nature of the securities trading which developed was very much influenced by the dominance exerted by the British enterprises in the colony at the time. The shares that were traded were those of British plantations and tin companies operating in South East Asia. The sharebroking business therefore was very much an appendage of the London Exchange. Shares were bought and sold only through the intermediation of brokers in London and the local brokers had to split the commission with them. (Parenthetically, it is interesting to note that until today, those longer established among the local brokers still have amazingly close ties with London brokers through this historical connection). Trading activities were largely restricted to the morning period based on the overnight London quotations received during the night. Orders for purchases and sales were similarly made by the use of telegrams to London brokers. There was a lapse of a minimum of six weeks for the delivery of shares to arrive from London. Trading activities were leisurely and very "gentlemanly" to say the least. Much of the local buying was for investment purposes. However, then as now, the local market was not immune to bouts of speculative mania.

The first instance of local share speculative fever took place in 1910. This was shortly after the brokers themselves had rented a small room on the ground floor of a local shopping "complex" known as the Arcade. The speculative fever was triggered by the rubber boom of

1910 caused by the automobile boom of the USA. The Straits Times (then as now, the leading newspaper of Singapore) was moved to remark that " ....the market had become a financial machine..... engrossing the attention and resources of half the town!" The boom created the impetus (as in 1981/83) for many people to move into the stockbroking business. Again the Straits Times remarked, " Half the town seems to have turned broker, jobber, or whatever you best call it....." However, many of the speculators and new brokers created by this boom were wiped out in the "bust" which followed in 1912.

The development in the subsequent 20 years was relatively slow, hampered as it was by the Great War and shortly thereafter the collapse of the rubber market and the implementation of the Stevenson Scheme to restrict rubber production. The 1929 Wall Street Crash and the London Crash which preceded it brought further hardship and ruthless price cutting competition to the local brokers. In June 1930, 15 local brokers decided it was better to cooperate than to engage in cutthroat competition and the Singapore Stockbrokers Association was established.

During the Thirties, share trading slowly became a much more pan-Malayan than purely Singaporean activity such that in 1938, the Singapore Stockbrokers Association was re-registered as the Malayan Stockbrokers Association. On the eve of the Second World War, the local stockmarket scene was not much different from that of 60 years earlier apart from the greater number of brokers. The trading was still largely restricted to shares of British plantations and tin companies.

### 2.2.2 - THE MIDDLE YEARS

The Fifties was a period of very significant development for the local stockmarket. The postwar prosperity, partly brought on by the Korean War commodity boom and the beginning of local industrialisation enabled a greater number of people to invest in shares. The gradual emergence of large locally resident companies in fields of finance and manufacturing industries created a counter weight to the predominance of British companies. It has proved impossible to locate any writings on the trading system in use during the Fifties. That there must have been a fairly sophisticated system is not in doubt since the first issue of the new Stock Exchange

Gazette (1961) listed 76 locally domiciled companies on its trading list. Many of these must have been publicly traded before the existence of the official Exchange. The Association continued its existence throughout the Fifties, with its activities at a high level according to contemporary reports. The industrial developments of the time, the achievement of Independence by Malaya in 1957 and the increasing sophistication of the financial market made the need for a proper stock exchange increasingly pressing.

In March 1960, 21 stockbrokers throughout Malaya and Singapore reconstituted the Association into the Malayan Stock Exchange (It was to be renamed the Stock Exchange of Malaysia when Singapore achieved Independence in 1963 and became part of the Federation of Malaysia). The service of the then Chairman of the Sydney Stock Exchange was retained to design and implement a trading system. In November of the same year, a Big Board system similar to the one in use in Sydney was adopted and official trading started. Two trading rooms, connected by direct telephone lines were established, one in Singapore and one in Kuala Lumpur. The two "exchanges" in fact worked more or less as one.

The Early Sixties saw continuous improvement in the organisation and completeness of the Exchange. The first issue of its official publication - The Malayan Stock Exchange Gazette- was published in June 1961. In 1962, Malaysian branch registers of British companies which shares were traded in Malaysia were made possible with the promulgation of the Enabling Order by the British government. With this move, the Malaysian Stock Exchange began to slowly move away from its previous very close tie to the London Exchange. Shares of British Companies could then be traded locally as if they were Malaysian shares. This development was to have very important implications for the transfer of domicile of many British plantations and tin companies from Britain to Malaysia during the Seventies. The creation of the Malaysian branch registers together with the disinvestment of overseas assets by British nationals throughout the late Sixties and early Seventies (partly due to continual weakness of the pounds and the very high Dollar Premium) eventually led to the majority of the outstanding shares in many of these companies being owned by Malaysians or Singaporeans. Since their assets had always been in Malaysia in the first place, once the majority ownership shifted to this region, it was inevitable that the official residence of these companies shifted to Malaysia as well.



There were several other important developments which took place during the Sixties whose effects were to become much greater than anyone had originally expected. The first was the adoption of a proper set of Rules and Bye-laws as well as Listing Requirements drawn up with the help of the Sydney Stock Exchange (1965). Although these rules and requirements were still very lax by current Western standards, they represented the first attempt at regulation of trading activities and some control over companies seeking to achieve listing on the Exchange. The second was the promulgation of the Malaysian Companies Act in 1965. The Companies Act required, for the first time, certain standards of information disclosure by the public companies as well as established certain rules governing the conduct of directors and insiders of public companies. The standards for disclosure represented considerable improvement on the previously accepted standards and permitted some meaningful financial analysis although they could still be said to be extremely lax standards (when compared with SEC requirements). The last major development was the creation of a Capital Issues Committee (CIC) under the chairmanship of the Governor of the Central Bank in 1968 whose function was to '...consider the draft prospectus or announcement of any company intending to make a new issue or to seek listing on the Exchange....'. This last development was destined to become a powerful force in moulding the share market in accordance with certain political aims of the government although the original aims of its creation were similar to those of the SEC in the US.

Another development which was not directly connected with the Stock Exchange was the separation of Singapore from Malaysia as a sovereign nation in 1965. The decision was taken at that time to maintain the Exchange as a single entity in spite of the political situation. In view of this, the Exchange's name was changed to the Stock Exchange of Malaysia and Singapore (SEMS) and its new identity was to continue for another eight years. In retrospect, it does seem that the decision was a futile one given the very different aspirations of the leaders of the two countries. Singapore, right from the start, saw itself very much the potential Switzerland of the East. It wanted to create a political and commercial climate that would lead to its becoming a great financial centre. To this end, since the separation it has increasingly tightened listing requirements and disclosure standards through successive Companies Acts. The Malaysian leaders however saw the Stock Exchange as one of the vehicles through which the indigenous people (i.e. the Malays) could be enriched and a



larger share of the corporate ownership transferred to them. Stock exchange listing has been, and still is, used as the "bait" to compel foreign and non-Malay owned companies to transfer some of their shares to the Malay community. As such, listing became very restrictive and post 1975, only a small number of companies is granted listing annually. (Chapter 6 will provide the detailed figures on listed companies.) It was therefore inevitable that the two countries would eventually split the Exchange. This took place in May 1973 at the same time as the interchangeability of the currencies of the two countries was ended and each allowed to float separately. The name of the Exchange was once again modified, this time to the Kuala Lumpur Stock Exchange (KLSE) and it had remained so since that time.

It is interesting to note that the local stockmarket had continued to be very volatile during the Sixties. There were sharp upward movements in 1962 and 1963. The Central Bank was moved to remark in its 1963 Annual Report thus, "... (we have seen) excessive speculation in the share market, concern over which was expressed last year.....Recent share issues appeared to have encouraged the gambling instincts of certain sections of the public.....aided and abetted by the failure of some of the broking firms to observe the rules of the Malayan Stock Exchange...." The market was to collapse three years later when first Singapore separated from the Federation and later Indonesia started its armed 'Confrontation' against Malaysia. However, by 1968, there were again sharp movements of the stockmarket upward. The Capital Issues Committee was created in that year partly to curb speculative activities fuelled by unscrupulous insiders. Just a year later, in the aftermath of the 1969 Race Riot, the market collapsed again. This sharp gyrations of the market took place throughout the Sixties and Seventies. It is not possible to make any definite comment about the relationship between high market volatility and efficiency at this stage. However, rapid and large swings in the market would present opportunities for profit if such swings could be predicted. Many local and foreign writers tend to point to such rapid swings in prices as evidence of the emotional rather than rational approach which Malaysians tend to bring to investment. The magnitude of the worst of these gyrations will be discussed in Section 2.3.

### 2.2.3 - POST SEPARATION IN 1973

Since the separation from the Singapore Stock Exchange, the most important development had been the increasing part played by the Malaysian government in the activities of the stockmarket. The Malaysian Government, both directly and working through the normally pliant KLSE Committee had increasingly used the stockmarket as a mean of achieving some of the aims of the New Economic Policy (NEP) which has the stated objective of increasing the indigenous people's share of corporate ownership to 30% (from 2% in 1970) by 1990. The Government had sought to achieve this by many different means using the stockmarket as one of the more crucial avenues through a multipronged action plan.

Firstly, it has been directly intervening in the stockmarket to make large scale purchases and carried out "dawn raids" on British owned but Malaysian based companies. The success of this policy can be seen from the fact that the largest of the previously British owned mining and plantations companies such as Malayan Tin Dredging (now known as Malaysian Mining Corporation), Guthrie Plantations, Sime Darby and Harrison's and Crosfields Plantations are now all largely owned by Malaysian statutory bodies or public corporations.

Secondly, it has made listing on the Exchange and the issual of new equity conditional upon satisfactory compliance with the New Economic Policy. This means that firms seeking public listing have to sell at least thirty percent of their stocks to Malay individuals or corporations at a price determined by the Capital Issues Committee. This has led to a slowing of the stream of non-Malay owned companies achieving listing on the KLSE to a handful a year. There is now thought to be a great shortage of investment opportunities for the newly prosperous non-Malays. This has probably partly contributed to the very high valuation of listed companies since 1980. At the same time, this policy of subsidy and encouragement has created a new shareowning class who hitherto had little experience of securities investment. Again, it is probably logical to conjecture that these new investors are probably more prone to irrational behavior than otherwise.

Thirdly, it had completely stopped the issual of new stockbroking licences to non-Malay firms while at the same time strongly encouraging Malays to enter stockbroking business in an industry that had hitherto been dominated by the Chinese. Given that the vast majority of the stock buying public are non-Malays and they would

prefer to take their business to Chinese firms, the existing stockbroker firms have no shortage of business. Add to that the existence of a fixed commission structure, there is even less incentive to provide better service to attract customers. At the same time, the newer Malay firms have neither the expertise nor the wherewithals to do any better. The standard of research carried out (if any at all) and the advisory service provided is therefore extremely low. Parenthetically, it is interesting to note that in Singapore where a much freer market exists, the standard of research and advisory service appears to have been improving quickly over the last several years.

The history of the Malaysian stockmarket since its separation from Singapore had been one of sharp contrasts. The second half of the Seventies and the early Eighties was a period of incredible growth in the nominal GNP of Malaysia through rapid industrialisation, discovery of petroleum fields and enormous government deficit financing (The nominal national income quintupled to \$57 billion in the space of five years). However, the structure of the stockbroking profession and the Exchange itself had remained stagnant partly due to strong governmental interventions. At the same time, the number of listed companies has not kept pace with the growth of the disposable income of the population ( see Tables 2.1 and 2.2). The enormous increase in the disposable income of the population of the country has also created a new class of investors with little previous experience or knowledge of investment. In short, this market displays many of the characteristics of the US market of the Twenties as described by Galbraith (1954). It is possible that such a market would lead to certain inefficiencies owing to the greater number of first time investors, the lack of a good advisory network and the shortage of shares. The inefficiencies, if any, will be examined later in this thesis.

## 2.3 - The Growth Of The Economy And the Stockmarket

### 2.3.1 -REASONS FOR THE RAPID GROWTH OF THE MARKET

In the years since the Malayan Stock Exchange was first officially established, it has grown explosively. The total market value of

companies which are listed on it has increased from \$ 573 million at the end of May 1961 to \$ 79,799 million by December 1983. Such a big increase was only possible because of an unique combination of three local factors.

- (1) Transfer of domicile of many British companies to Malaysia;
- (2) A rapid increase in the number of local listed companies; and
- (3) Rapid growth in the GNP of the country.

Tables 2.1 gives the various figures connected with the growth of the Malaysian stockmarket. The table provides the figures on a four yearly basis to reduce the year to year fluctuation. The figures provided are for beginning of the year except for the first and last years. The cumulative compounded annual rate of growth for each figure is also provided.

As mentioned in Section 2.2, the Malaysian market had very close ties with the London Exchange right up to the early Seventies. Many of the British plantations and tin companies which were not listed officially on the Malaysian Exchange were actually traded (in pounds sterling) almost as if they were Malaysian companies. Their daily price and volume data were reported by the local newspapers and many brokers made a market in them. However, with the establishment of the Malayan branch registers and the gradual transfer of the domicile of British companies to Malaysia, the importance of these companies declined such that by 1983 none was left in this category. The second major column in Table 2.1 shows clearly this decline. The indicated explosive growth of the Malaysian listed companies is therefore to a certain extent misleading. As can be seen from the third major column of Table 2.1, the combined value of these two categories of listed companies only increased at slightly above the pre-1976 GNP growth rate (Table 2.2). Post 1976, there was an apparent spurt in the growth rate of the market value of the listed companies over and above the growth of the nominal GNP. This spurt can be attributed to the higher valuation given to shares during this period. This higher valuation can be seen from the average dividend yield of the stocks in the database given in the fourth major column of Table 2.1.

Table 2.2 provides further information on the growth of the Malaysian stockmarket by showing two of the better known stockmarket indices, the GNP of Malaysia at current prices and the private sector liquidity. The two better known Malaysian indices provided are the

TABLE 2.1  
CHANGES IN THE MARKET VALUATIONS OF STOCKS TRADED LOCALLY  
FOR THE PERIOD 1961 TO 1983

YEAR	LOCAL COMPANIES LISTED ON THE MALAYSIAN /SINGAPOREAN EXCHANGE			FOREIGN RESIDENT CO'S TRADED IN THE MALAYSIAN /SINGAPORE MARKET			BOTH CATEGORIES			MEDIAN DIV. YIELD
	NO.	MKT VALUE \$ M	%	NO.	MKT. VALUE \$ M	%	NO	MKT. VALUE \$ M	%	
1961	79	573	-	88	1975	-	167	2548	-	NA
1964	107	1867	40.1	96	2059	1.2	203	3926	13.2	NA
1968	141	4165	30.3	66	1583	-2.9	207	5748	7.3	0.0327
1972	224	18267	35.1	31	844	-7.1	255	19111	13.9	0.0350
1976	254	12537	22.0	10	150	-5.7	264	12439	10.9	0.0384
1980	249	42930	24.8	1	107	-14.0	255	43037	20.0	0.0333
1983	271	79799	24.5	0	NM	0	271	79799	16.5	0.0265

TABLE 2.2  
GROWTH IN MALAYSIAN STOCKMARKET INDICES AND GNP  
FOR THE PERIOD 1961 TO 1983

YEAR	KLSE INDEX 1.1.70=100	CUM.% ANNUAL GAIN	NST INDEX 1.1.67=100	CUM. % ANNUAL GAIN	MALAYSIAN GNP AT MKT PRICES \$ M	CUM.% ANNUAL GAIN	PRIVATE SECTOR LIQUIDITY \$B	CUM. % ANNUAL GAIN
1961	NA	-	NA	-	5891	-	NA	-
1964	NA	-	NA	-	8021	10.83	NA	-
1968	NA	-	168.53	29.82	10071	7.96	3.3	-
1972	433.76	63.09	432.73	27.65	12163	6.81	5.8	15.1
1976	229.79	16.42	279.92	10.84	26983	10.68	12.8	18.5
1980	532.79	16.42	834.37	16.66	50018	11.92	27.7	19.3
1983	644.22	14.23	1404.17	20.77	63802	11.44	41.2	18.3

NOTES:

% = Cumulative annual compounded rate of growth from the first available datum.

NA = Not Available

NM = Not Meaningful



blue chips New Straits Times (NST) and the KLSE Industrial Indices. As can be seen from this table, there was a most rapid growth in the indices during this period. However, the rapid rate of increase shown may be overstated by the indices as they tend to bias the growth rate upward, albeit in different ways. The NST Index is a non-weighted index which means that it is bias towards the smaller of the sample companies. The KLSE Index is based on the total market value of the sample companies. It therefore tends to bias the growth rate of the market upward because the overall increase in market value includes new shares created as a result of takeovers of previously non-listed companies.

The growth of the indices does not show up the very large scale transfer of stocks from the founders of firms to the general public through new listings. Each time a company is listed, a large percentage of its shares is transferred to the smaller investors. It is possible that the characteristics of the individual investors might have changed during this period. With very rapidly rising income and a traditionally high saving community (throughout this period, the national savings rate stayed above 25%), there might have been a large emergent investment class. It is not possible to obtain figures on the amount of private savings outstanding but an indication of the amount of funds available can be obtained by examining the figures for private sector liquidity. As can be seen in the last major column of Table 2.2, this had been increasing considerably faster than the GNP or the indices. Owing to the lack of "paper" investment avenues other than stocks (there being no active bonds market), it is very possible for this large number of newly rich savers to turn to the stockmarket. It is admitted that there are no figures to confirm this statement. (An analysis of share ownership patterns will be shown in the next section). We have here a situation that is reminiscent of the situation in the US during the Twenties. There was a rapidly expanding economy, rise of new industries and the creation of a new prosperous middle class with adequate savings for making investments - A situation which has been attributed by Galbraith, among others, to have fuelled the stockmarket boom of the late Twenties leading to the Great Crash. It is not possible to be as deterministic about the Malaysian investors as writers on the Great Crash without further indepth research. But it is possible that the influx of so many new investors during the late Sixties and throughout the Seventies in Malaysia could lead to the development of a "market" that is dichotomised, a market with a strong



representation of inexperienced investors who are perhaps less rational in their expectation and who are also possibly more prone to fall prey to manipulators and market rumours. Such a situation and the resultant behavior pattern would be more likely to lead to market inefficiencies.

Parenthetically, it is interesting to note the very large variability of the Malaysian stockmarket, as can be partly seen from the figures in Table 2.2 above. In fact the swings undergone by the market had been much worse than the figures may first suggest. For example, the KLSE Index has its base date as 1.1.70 but at the peak of the 1973 "bull market", the index stood at close to 600. The Index was to collapse to 160 by the end of 1974, a mere 22 months later. The same thing was repeated in the 1981 "bull market" when the index rose from 220 in early 1978 to a peak of over 820 by June 1981 and was to decline by over 50% within 12 months. The fluctuations among "non-blue chips" are of course even greater. It is not unknown for these companies to lose 90% of their value within a 18 month period. It would be overly deterministic to state that this variability is a result of an inefficient market but again such wild swings are possibly indicative of the less than perfectly rational approach of some of the local investors.

## 2.4 - Patterns Of Share Ownership

A survey of the ownership patterns of Malaysian shareholders is handicapped by the dearth of publications on the subject. The only article of significance that this writer could find is Ooi (1979). Some information could also be gleaned from corporate annual reports which had recently started to provide a list of the significant shareholders. Tables 2.3 and 2.4 are summarised from results of the survey carried out by Ooi (1979). This survey was based on questionnaires mailed to the listed companies domiciled in Singapore (1975-1976) and Malaysia (1977). The basis of the survey is the number of owners in each company and the number of shares owned by each owner in each company. No attempt was made to classify the ownership in accordance with the market value of shares owned. According to the author, about 50% of the companies responded to the questionnaires. The two tables below give the ownership pattern

according to the number of shares owned by each class of owners.

TABLE 2.3

OWNERSHIP PATTERN OF SINGAPORE INCORPORATED COMPANIES

CLASS OF OWNERS	NO. IN CLASS	NO. OF SHARES HELD BY CLASS	PERCENT '000
INDIVIDUALS	97764	573,013	
JOINT ACCOUNTS	601	4,056	
INDIVIDUALS TOTAL		577,071	29.7
NOMINEES & TRUSTEES	3543	458,250	23.6
INSTITUTIONS	542	178,121	9.2
CORPORATIONS	3238	715,194	36.8
OTHERS	714	16,031	0.8

TABLE 2.4

OWNERSHIP PATTERN OF MALAYSIAN INCORPORATED COMPANIES

CLASS OF OWNERS	NO. IN CLASS	NO. OF SHARES HELD BY CLASS	PERCENT '000
INDIVIDUALS	28156	70,192	
JOINT ACCOUNTS	77	187	
INDIVIDUALS TOTAL		70,379	32.0
NOMINEES & TRUSTEES	560	50,659	23.0
INSTITUTIONS	333	13,135	6.0
CORPORATIONS	951	85,285	38.8
OTHERS	57	475	0.2

Table 2.5 below is based on a survey carried out by the writer from information published in the 1983 KLSE Annual Companies Handbook. In the last three years, it has become widely accepted that listed companies should disclose its largest shareholders. This disclosure policy has now been accepted by a big majority of listed companies although there is no force of law or other institutional compulsion

behind it. This table shows the percentage of the outstanding shares of the 30 largest companies (at the financial yearend closest to the publishing date of the KLSE Handbook) owned by the three and five largest owners. In addition, the table also gives the name of the zaibatsu type corporate group with which each company is generally associated (unless it is not associated with any). It must be stated beforehand that this survey tends to give an understated picture of the degree of control of listed companies by individuals and holding companies since companies of a group tend to be linked with each other through cross holdings. Moreover, the shareholdings of the controlling share holders are often held through nominees and trustees. A study of the list of directors can nevertheless provide an indication of the persons/groups in control.

TABLE 2.5

OWNERSHIP OF THE THIRTY LARGEST LISTED COMPANIES ON THE  
KLSE BY THE THREE LARGEST AND FIVE LARGEST SHAREHOLDERS

	MKT. VALUE \$'000	PART OF:	LARGEST 3 %	LARGEST 5 %
COLD STORAGE	542,640	OCBC	56.57	63.34
F & N	638,400	OCBC	24.63	29.36
GENTING	786,974	LGT	NA	
HL INDUSTRIES	478,897	HL	NA	
M. BREWERIES	1,234,716	OCBC	78.42	84.44
MTC	783,000		56.72	60.10
MULTI PURPOSE	883,192	MCA	53.29	53.67
PERLIS	513,623	KB	>50	>50
PROMET	615,681		48.66	60.25
SIME DARBY*	1,575,219	SDB	MAL. GOV'T CONTROLLED	
S. STEAMSHIP*	465,863		67.71	72.93
S. TRADING	1,053,000	OCBC	NA	
TASEK	514,372		25.66	32.71
TMB*	520,560	SDB	76.38	79.36
DBS*	1,945,071		59.78	64.53
HL FINANCE	1,251,000	HL	39.3	52.39
MBB*	1,251,000	ASN	50.91	64.91
OCBC	3,911,787	OCBC	NA	
UOB	1,633,197		NA	
OUE	917,138		52.68	62.48
SHANGRI-LA	477,000	KB	50.15	67.89
BANDARAYA	491,231	MCA	46.77	54.36
CITY DEVEL.	485,390	HL	64.50	78.35
SEL. PROPERTIES	473,757		NA	
SINGAPORE LAND	705,407	HL	73.12	77.65
HIGH & LOWLANDS*	812,832	KLK/ASN	48.61	58.19
KLK	686,752	KLK	45.65	48.89
CON. PLANTATIONS*	947,878	SDB	62.69	65.16
UTD. PLANTATIONS*	517,400	FIMA	69.94	76.51
MMC*	922,275	ASN	65.76	73.39

\* These are companies in which either the Malaysian or Singaporean Government has a controlling or large interest.

From these two surveys, it is possible to develop some prima facie idea of the pattern of share ownership in Malaysia. The picture which emerges is one which is very different from that of the Western markets. There are several significant differences. Firstly, there is only a minor representation from institutions, Secondly, corporate insiders appear to control a very large proportion of the outstanding shares. Each of these characteristics will be further examined and the reasons for them will be discussed in the next subsection.

**THE LACK OF INSTITUTIONAL OWNERS** - In the West, institutions such as pension funds, insurance companies and investment trusts hold a very large and increasingly larger share of the total number of outstanding shares. As can be seen from Tables 2.3 and 2.4, their share in Malaysia/Singapore is very small. There are several reasons for this situation. Firstly, there are very few privately run pension schemes because of compulsory contribution by both employers and employees to state run pension scheme ( in the form of provident funds). There are only a handful of privately run pension schemes which mostly predate the establishment of the state run scheme. The state run provident funds organisation largely invests its money in Treasury Bills and Bonds. It was only in the recent years that this organisation started to consider the stockmarket. Second, almost all insurance companies are foreign controlled and as a result their investment strategy tended to be decided on a global basis. What funds the local insurance companies have to invest are again invested largely in Treasury Bonds and Bills. Thirdly, unit trusts, other than state run unit trusts specifically for the Malays, are very insignificant. Although the rate of saving is very high in Malaysia/Singapore (>20%), few people are willing to invest in unit trusts which suffer from the "chicken or egg" problem in terms of size. That is, until they are large enough, they could not spend enough on research and marketing to attract the clientele. Unless they can attract a large enough customer base, they cannot afford to do marketing or research of a high enough calibre.

**CORPORATE INSIDERS CONTROL A VERY LARGE PROPORTION OF THE OUTSTANDING SHARES** - Unlike the West, where there is a very large degree of separation between ownership and management control of public corporations, most of the listed companies in Malaysia/Singapore are still controlled either by the original pioneering entrepreneurs and/or their immediate descendents and state owned corporations. To a certain extent, the outside shareholders

are at the mercy of the insiders in terms of disclosure of relevant information and the speedy release of crucial news.

The Malaysian market also has the feature of little trading for a large proportion of the holdings of many listed companies. The reason is that most of the insiders need to hold on to their shares very tightly since they they would have already sold at least 30% of the shares to Malay interests as one of the original conditions for being listed in the first place or as a condition for their continued listing. The Malay interests are almost always outside the controlling group and at same time often monolithically controlled the possibility of losing control is always present if additional blocks are sold. The Malay corporations, being mostly state owned, are usually prevented from selling by their articles. A very large part of the outstanding shares therefore are not freely available for trading in the market under the normal circumstances.

It is possible to make certain conjectures on the behavioral results of this pattern of ownership. Firstly, the lack of institutional demand and the tight control of insiders leads to a situation whereby much of the trading in shares are carried out by individuals. The lack of stabilising purchases or sales by institutions tends to further exaggerate the normal swings in trading volume that is present in any share market.

Secondly, it is very possible that the individuals, especially first time investors, not having any concrete strategy to go by (this aspect of the market will be examined in Sections 2.6 and 2.8), tend to base their purchases more on the state of market. That is, news of a strongly rising market would attract new investors who tend to rely more on rumours and hearsays than on any economic principle. When the economy of the country is prospering (concurrently, the stockmarket is likely to be "booming" as well), a great number of individuals would enter the market, leading to a tight supply situation and wild price increases. The reverse would take place when the economy goes into a recession. While at this stage, there is little documentary evidence for this conjecture, there certainly have been numerous comments by local and foreign writers on this feature of the market (Section 2.8 will quote some of the comments on the local market by a respected regional publication). If these conjectures are correct, the existence of a large number of "floating" non-knowledgeable investors can perhaps lead to their





being exploited by the more knowledgeable investors and hence may lead to inefficiencies.

The existence of conditions which can lead to inefficiencies does not necessarily mean that there are testable signs of such. There are several reasons for this. Firstly, a totally inefficient market (if there exists a totally inefficient market), is likely to show many of the outward appearances of a totally efficient market. Secondly, the need to go beyond reasonable doubt in testing for inefficiency increases the possibility of the tester committing Type I errors. A researcher needs to demonstrate better than 95% significance if he is to be sure of his finding. But from a practical viewpoint, an investor would probably be quite satisfied if his strategy proves right, say, 75% of the time. Thirdly, the market participants could be collectively biased such that they do not exploit the opportunities for abnormal gain although such opportunities exist. Fourthly, even if there are exploitable inefficiencies, it may not be possible to design tests to uncover them, especially since the tests to be carried out are largely replicates of tests already carried out in the West.

## 2.5 - The Trading Volume

Whilst there have been no well known papers specifically commenting on the cause of variability in trading volumes and there are no theories specifically linking trading volumes to the efficiency of a market, the variability of trading volume in the Malaysian market could possibly provide a further pointer to the basically immature characteristics of the market which have been remarked upon earlier.

It is normal for any securities market to have dull periods and active periods, usually coinciding with periods of falling and rising prices. In a mature market, with a large share of institutional trading, there is usually a "basal" volume of transactions. Thus it can be said that the variability of its trading volume is not too great. We can draw some conclusions by observing volume charts on the NYSE. On a day to day basis, the volume on its heaviest trading day in any one year is no more than five times that of another normal day. On a month to month basis, it is rare to find the ratio of the heaviest trading month in a year exceeding that of the lightest month

by more than 2. In the Malaysian market, this ratio is far greater. The ratio of the heaviest trading day volume to the lightest day in any one year has exceeded 20 while 10 is regularly breached. On a month to month basis, the ratio regularly exceeds four. The one exception is the post 1973 peak period. For some unexplained reason, the trading volume of the two individual markets after they have been split approximately equalled that of the pre-split market.

The transaction volume patterns of NYSE and KLSE are compared in the following tables. Table 2.6A is constructed from commercially available volume charts of the transaction volume of the NYSE for months surrounding the 1973, 1981 and 1983 peaks. Table 2.6B shows the monthly volume surrounding the past three price peaks experienced by the local market - 1969, 1973 and 1981. The trading volume for the peak month and that for the second, fourth, sixth, twelfth and eighteen months before and after the peak are provided. These months are chosen without any special attempt being made to include the months with the highest and lowest volumes.

The ratios have varied from 3.3 to 2.5 to over 4 (the differences in the ratios in terms of value of shares traded are even more pronounced). This seems to bear out the earlier conjecture that with rising prosperity, a great number of individuals have adequate savings for stockmarket investment. As first time investors, their investment strategy (if it can be called that) is probably a lot less rational and tended to be swayed by the immediate past performance of the market. There is hence probably a large number of "floating" investors who move in and out of the market. Their volume is such that at times, they dominate the trading activities.

TABLE 2.6A

## TRANSACTION VOLUME PATTERNS SURROUNDING PRICE PEAKS—NYSE

MONTH	1973 PEAK VOLUME IN NO OF SH MIL/DAY	1981 PEAK VOLUME IN NO OF SH MIL/DAY	1984 PEAK VOLUME IN NO OF SH MIL/DAY	"INDEX" OF VOLUME PATTERN PEAK=100
-18	12.7	56	60	82
-12	18.3	35	90	85
- 6	14.0	57	78	90
- 4	12.0	50	82	82
- 2	20.3	55	87	105
PEAK	18.6	45	115	100
+ 2	15.7	42	85	84
+ 4	15.0	48	88	88
+ 6	13.5	48	82	84
+12	18.0	50	120	104
+18	12.3	90	NA	133

TABLE 2.6B

## TRANSACTION VOLUME PATTERNS SURROUNDING PRICE PEAKS—KLSE

MONTHS	1969 PEAK VOLUME IN NO OF SH MIL/MON	1973 PEAK VOLUME IN NO OF SH MIL/MON	1981 PEAK VOLUME IN NO OF SH MIL/MON	"INDEX" OF VOLUME PATTERN PEAK=100
-18	35.49	54.66	57.54	85
-12	43.05	62.14	136.19	115
- 6	34.17	107.95	107.17	131
- 4	44.56	83.30	186.41	142
- 2	62.06	63.39	206.50	149
PEAK	35.49	48.40	144.82	100
+ 2	46.18	34.75	84.81	87
+ 4	57.59	87.43	50.92	92
+ 6	53.83	65.82	117.76	123
+12	30.61	58.72	86.54	89
+18	18.67	95.87	73.91	101

## 2.6 - Sophistication and the Availability of Publications and Advisory Services

As mentioned in Chapter 1 of this thesis, in the West the availability of the great number of brokers' research departments and other advisory services as well as the numerous publications on the subject is very much taken for granted. Most theorists on the EMH do not actively consider the part played by them in the attainment of market efficiency. In the West, just about any investor can obtain a great deal of information on most of the listed companies. This together with the long history of investment by the public most probably has contributed to the efficiency of the market. The Malaysian situation is very different. The typical individual investor has very little knowledge of accounting and economics, cannot obtain advice easily and does not know how to get information on any company. In sharp contrast, there are knowledgeable investors and well informed insiders operating in the very same market. It is difficult to believe that the cost of information search is the same for the two classes of investors. In economic terms, if a market is such that the cost of information search is, on average, very high but is not the same for all participants (which is manifestly possible or even likely), there would be opportunities which can be exploited by those with the lowest cost of search. It would be difficult for a Westerner to conceptualise the degree of unsophistication of the Malaysian stockmarket in terms of availability and quality of information on investment. It would be instructive to look at two particular aspects of this problem:-

- (1) The availability and quality of investment publications; and
- (2) The availability of advisory services.

THE AVAILABILITY AND QUALITY OF INVESTMENT PUBLICATIONS. There are in total a population of 17 million (in 1984) in Malaysia and Singapore with an average level of income a fraction of that of the United States (under US\$ 2,000 per capita in 1984). Given such a small consumption base, it is unlikely that there can be much in the way of specialised investment publications. In fact, there are none. The closest one could get to the likes of Barron's or Investors Chronicle would be some specialised columns in several of the local

newspapers. Needless to say, there is nothing of the quality or even the form of Fortune, the Economist or Business Week. The Far Eastern Economic Review (a regional publication that is similar to the Economist) has occasional articles on the Malaysian economy and individual Malaysian/Singaporean companies. However, the circulation of this newspaper is very small (35,000 worldwide in 1984). The typical investor has to either rely upon the business section of his daily paper, or to obtain the required information himself. The second avenue is obviously not open to the typical small investors.

It is not possible to state categorically what the quality of the journalistic writings on investment in the local newspapers is. Section 2.8 will include comments from the Far Eastern Economic Review on this aspect of the market. However, it would be true to say that the standard of writing is well below that of the rest of the English speaking world. Much of the writings consist of verbatim reporting of company annual reports or news releases without comments. Most of the so-called investment journalists have no prior training on financial analysis or accounting. The standard is no better whether the publication is supposed to be a "business" publication or not.

**THE LACK OF ADVISORY SERVICES FOR INVESTORS-** It is normal for an investor in the West to get advice from his stockbrokers regarding the wisdom of his intended purchase or sales. Similarly, he could subscribe to (or his broker would supply him) published opinion on his intended investment from commercial advisory firms such as the Standard & Poor or Valueline. One may argue about the accuracy and quality of advice provided but it would be difficult to argue about the overall high standard of research and workmanship which go into their preparation. Even such a person as Graham was quoted by Beaver (1981a) as saying that the quality of research had improved to such an extent that it had become very difficult to find undervalued companies. What is more important than their accuracy is their overall impact on the literacy of the investment public. After the experience of the Great Crash and that of the "Nifty Fifties Mania" of the late Sixties, most advisory services do caution their advisees to be prudent and rational. It is inevitable that there would still be pockets of inefficiency today but it is rare to read of advice of the genre, "Given the prospect of the company, the current Price Earnings Ratio of 50 is fully justified" as can often be found in Malaysia. It would seem likely that the long history and

weight of such advice has some effect on the thinking and action of the average investors.

It is notable that in the whole of Malaysia, until 1982, there was not a single broker firm which published a newsletter on a regular basis while there were only three which did so by the end of 1984. In Singapore, there were eight which were doing so by the end of 1984. There was only one firm which provided an investment newsletter subscription service throughout Malaysia and Singapore but it closed down sometime in the early Eighties. The local Extel card service only became generally available from 1983. But given the cost of these services, their reach must have been very limited. There were only four registered investment advisors at the end of 1982 (all investment advisors have to register with the Registrar of Companies who supplied this information) in Malaysia (private communication from the Registrar of Companies). The typical advice one gets from the brokers in Malaysia and Singapore is based on hearsays and rumours rather than facts and analysis. For, until very recently, it does not require any qualification to be either a broker or a broker's representative (for the Malays, there is still no definite requirement). It is generally accepted that the best advice on investment comes not from local firms but from British based firms such as Lawrence Prust or Vickers Da Costa.

## 2.7 - Amount of Corporate Disclosure

The amount of information disclosed by the listed companies in their annual reports, their various offer documents and their availability to the investors at large have an obvious effect on the cost of information search for the investors. In the US and Britain, the amount and quality of information disclosed is determined by such institutions as the Accounting Standards Board and the SEC as well as the relevant laws of the land. In Malaysia, their equivalents would be the Malaysian Association of Certified Public Accountants (MACPA), the Capital Issues Committee (CIC) and the 1965 Companies Act. In Singapore, their equivalent would be the Singapore Society of Accountants, the Securities Industry Council and the Companies Act.

In Malaysia, and to a lesser extent in Singapore, there are several institutional barriers to having adequate disclosure by the listed



companies. Firstly, given the fact that most listed companies are still controlled by their founders or their descendents, the concept of the public right to know has not yet taken very deep root. The General Manager of the Singapore Stock Exchange, Mr. Lim Hua Min, was quoted as saying (in Luchangco 1973), '.....(companies generally)..... comply only with the minimum in accordance to statutory requirements and treat the annual report as an unnecessary chore.....' Luchangco in the same article spoke of the '.....need to improve on the current methods of corporate disclosure and financial reporting..... And in Singapore, the statutory requirements are even below those existing in such countries as United States (Sic) and the Philipines.' The statutory disclosure requirements of Malaysia are even lower than those of Singapore's.

As has been mentioned earlier, the original functions of the CIC have been largely supplanted by its new function of enforcing the implementation of the New Economic Policy. For the CIC, good disclosure by the listed companies is a far less pressing objective than the need to achieve 30% Malay ownership in the corporate sector by 1990.

The MACPA as yet lacks the prestige and power of the ASB. It is only recently that the MACPA has begun to enforce disclosure standards on local listed companies. Prior to the enforcement of these standards, the companies merely had to conform to the requirements laid down under the 1965 Companies Act. Under the Act, the amount of information that had to be disclosed was minimal. It centred around unimportant issues such as the allocation of the profit into various classes of reserves which is of no consequence from a financial viewpoint. Table 2.7 is a list of the International Accounting Standards (IAS) which have been adopted by the MACPA for enforcement on local listed companies. It is most notable that a piece of information as basic as the dollar value of sales was not required to be disclosed until after the enforcement of IAS No. 5 on 1.1.78. It was not until 1.1.83 before the enforcement of IAS No. 14 required the listed companies to disclose very superficial segment information. Until today, the listed companies are not required to disclose trading accounts which makes prediction of future earnings almost impossible. Judging by the standard of annual reports of Singapore incorporated companies, the required standards of disclosure there cannot be very much higher.

TABLE 2.7

## INTERNATIONAL ACCOUNTING STANDARDS- NO., TITLE AND ENFORCEMENT DATE

1.DISCLOSURE OF ACCOUNTING POLICY	1.1.78
2.VALUATION OF INVENTORIES (Cost Concept)	1.1.78
3.CONSOLIDATED STATEMENT POLICY	1.1.78
4.DEPRECIATION POLICY	1.1.78
5.DISCLOSURE OF RELEVANT INFORMATION (Incl. SALES)	1.1.78
6.PRICE LEVEL ACCOUNTING (Not Mandatory)	1.1.78
7.STATEMENT OF CHANGES IN FINANCIAL POSITION	1.1.79
8.UNUSUAL, PRIOR PERIOD ITEMS AND CHANGES IN ACCTG. POLICY	1.1.79
9.ACCOUNTING FOR RESEARCH AND DEVELOPMENT	1.1.80
10.CONTINGENT AND OTHER EVENTS AFTER BALANCE SHEET DATE	1.1.80
11.ACCOUNTING FOR CONSTRUCTION CONTRACT	1.1.80
12 ACCOUNTING FOR DIFFERED TAX	1.1.81
13.PRESENTATION OF CURRENT ASSETS AND CRT. LIABILITIES	1.1.82
14.REPORTING FINANCIAL INFORMATION BY SEGMENTS	1.1.83

It is important to note that the MACPA has no force of law behind its power to enforce certain accounting standards. If a listed company refuses (as many do on occasions) to uphold the standards, the most that MACPA can do is to ask the auditors concerned to qualify the offending company's annual report. In Malaysia where the standard of journalistic reporting and the general level of investment literacy is so low, qualification of an annual report would pass almost totally unnoticed.

It ought to be mentioned also that public companies in Malaysia/Singapore do not normally welcome requests for current or back issues of their annual reports. Nor are there public libraries where one can obtain this type of information. It is this writer's belief that the cost of search for the typical small investor must be extremely high compared with the small number of larger investors and insiders.

## 2.8 - Far Eastern Economic Review: Comments on the Local Market

A person not familiar with the nature of the Malaysian/Singaporean market is likely to be skeptical of some of the assertions made regarding the lack of sophistication of the market. In order to provide a neutral view of the market, the foremost economic newspaper of the South East Asian region will be quoted extensively in this section. The quotations are taken from a special feature on the Malaysian/Singaporean stockmarket published on 12th April, 1984. Although the comments are more applicable to the market during the last several years of the research period, they do provide a glimpse into the workings of the stockmarket in general. It is notable also that the comments on the excessively high valuation of stocks in the local market are only applicable during the "bull market" phases and also during the last few years of the research period, while during other times, stocks can be very lowly valued. The comments will be divided into various subsections in line with the organisation of this chapter.

### 2.8.1 - COMMENTS ON THE GROWTH AND DEVELOPMENT OF THE MARKET

"With more than 70% of their shares co-listed, the stock exchanges of Singapore and Malaysia are as tightly linked as runners in a three-legged race. ....Singapore and Malaysia are, in effect, a single market with a split personality. "

"The SES and the KLSE share with Tokyo some of the world's highest P/E ratios. But, besides being far from world economic powers, Singapore and Malaysia also differ from Japan in their lack of assured continuity of industrial management and ownership. Higher political risk and Malaysia's enforced transfer of wealth into Bumiputra (Malay) hands present the predominantly Chinese movers-and-shakers of industry and the equity markets with the incentives to seek short-term rather than long-term gains.

"As a result, the markets are geared more to redistributing than to creating wealth. Traditional equity-holders rush to flog off their assets to the SES/KLSE market-makers -- middle class Chinese punters, bumiputra and foreign institutions. In the process, the assets often

get handsomely revalued upwards by the market through a panoply of excitement generating equity restructuring 'events' such as rights and bonus issues, share splits, new listings and takeovers."

#### On Malaysia:

"The urgency of transferring equity into bumiputra hands accelerates with the approach of the policy's 1990 deadline. The emergence of bumiputra entrepreneurs such as ..... and ..... to take up the slack (in government funding for stock investment for the Malays) (also) provides new personalities to stoke up the rumour engine.

".....Such overhanging questions (regarding the exact nature of the NEP) only magnify the policy's menace in the eyes of traditional Chinese wealth-holders.

"But they do get two messages loud and clear: their businesses face forced equity restructuring and their days of unchallenged economic sway are numbered. That adds to a deteriorating situation from which many would just as soon flee. Equity restructuring, since it is mandated anyway, can be turned to account as an avenue of escape."

".....And if enough excitement can be generated, a lively secondary market in a counter offers opportunities to insiders..... Syndicates of big investors can readily ramp up prices. ....Once an appetite is built up, market players become attuned to capital-restructuring ploys to the exclusion of fundamentals.....

".....The resulting 'market culture' prizes - dizzying over-subscriptions, reward equity dilution ...."

#### On Singapore

"Singapore, with its higher liquidity, offers a livelier trading arena.....

"Last year, for instance, brokers and punters in Singapore's budding financial centre had access to a reservoir of banking liquidity 10% larger than Malaysia's without any official restraint on banks lending to stockmarket players.

"As to the amounts available to punters, a very rough idea may be had

by looking at the sums raised in application monies for new-shares issues. Singapore's record breaking L&M issue mobilised S\$2 billion, and S\$1.5 billionworth of application monies are the general rule for SES newcomers. If stags can pull together that much money on a sudden one-shot basis, brokers conjecture, they must have at least as much for on-going speculation."

## 2.8.2 - COMMENTS ON THE BROKERS OF THE TWO COUNTRIES

"A glimpse of the typical brokerage office in each country sums up the contrast between the stock-exchange communities of Singapore and Malaysia. A SES member firm is likely to occupy a suite in a downtown skyscraper. Banks of remisiers and order takers track prices on their desk-top computer screens,.....More screens and telephones cluster on a central trading desk.....The research staff has its own precinct.

"One spin-off (of the computerised database provided by SES) is the relative advanced standard of research in Singapore's brokerage community. ....

"While still short of Wall Street standards, most of these publications now feature a balance of market overview and company focus, plus both technical and fundamental analysis.....

"Yet behind Singapore's facade of Anglophone, numerate efficiency, the local market remains manipulation prone and rumour driven -- what brokers call "situational".....

"Partners in Malaysian firms, by contrast, are just as likely to be found alongside the remisiers and order clerks manning the telephones on a raised dais facing the wall-to-wall chalk board. Clerks rush to scrawl updated quotations as the punters crowd the back of the dealing room, swapping gossip and intermittently buttonholing a broker to pass an order. Research consists of a looseleaf binder of hand-transcribed accounting data from the counter's reported results. The scene might be set in a shop-front or a hotel arcade -- this correspondent found one brokerage in the back room of a Chinese temple.

"'We simply do not need research,' explained one Malaysian broker

whose outstation firm has got by for nearly 30 years without any."

### 2.8.3 - COMMENTS ON STOCKMARKET VALUATION

"Yet even as economic growth has slowed down.....the stockmarket indices have more than quadrupled over the past five years. ....But how long can this share-price levitation go on? Does the market's current long-term uptrend represent the economies' innate bouyancy, or a large-ditch speculative sprint before prices implode and the towkays (the big Chinese businessmen) bail out?

"One broker likens the lofty P/E ratios of Singapore and Malaysian stocks to the aroma of durian,.....For investors who can overcome their initial squeamishness, he pointed out that the fruits of these stockmarkets, (i.e. capital gains) are tax-free. But non-initiates might be excused for suspecting that some local equity may prove in the end to be just what it smells like -- unsustainably overvalued.

"Not that the responsible government agencies are over-generous in their valuation of newly capitalised assets. A CIC source told the REVIEW: "We see it as our stewardship to keep valuations wedded to economic reality." .....That may be true as far as the stock exchange door, but once inside, the divorce is effected. 'It is perverse,' commented one analyst. 'It almost seems as though the more conservatively the regulators assess an issue on its introduction to the market, the racier will be the secondary market speculation.'

"The malady is even more strikingly demonstrated by the market's unflappability in the face of such capital expanding ploys as rights and bonus issues, stock dividends and stock splits. Seldom is the earnings-per-share dilution fully reflected in the stock price, even at the listing date. And the counter's rate of appreciation often gets enough of a boost from the excitement thus generated to carry it back to its predilution absolute price level in short order.

"The stockmarket landscape is littered with corporate shells -- spent tin mines or plantations, played-out industrials -- whose most viable asset is their stock exchange listing. From such beginnings sprang such sometime stockmarket darlings as Malayan United Industries, a M\$1.9 billion combine that (was) .....parlayed out of a long dormant rice company during the last speculative heyday prior to the



1981 crash.

"Some of these high-flyers will emerge as market mainstays. Some will go to ground in the next crash and will never get up again.....While it is impossible to firmly pin anything on anybody, there is the feeling that some syndicates of big players and their broker friends jiggered prices up to where they had to fail."

## 2.9 - CONCLUSION

In this short survey, it is hoped that it is possible to develop a prima facie idea of the nature of the market we are dealing with. It is a market which is very different from the present day markets of the West. This market with its great disparity in the cost of search for different market participants, the tight control of insiders, the poor disclosure of financial information, the lack of institutional investors and the poor standard of publication and advisory services probably resembles the Western markets of 50 or 60 years ago. It is therefore hypothesised that the EMH, which was developed for the Western markets of the Seventies, is perhaps not fully applicable to this market. This being so, it would be necessary to develop an alternate model of stockmarket behavior which can take into account differences in the nature of stockmarkets. Such a model has been previously developed in Chapter One and this thesis will examine the applicability of this model in Chapter Seven and Eight.

## References

Unlike the rest of this dissertation, the materials used as reference for this particular chapter are not of the same academic standard. As a result, it has been decided that the reference materials will not be included in the formal bibliography appended at the end of this dissertation. This chapter is written using materials from many different sources. Apart from the few instances where it is possible to directly attribute certain information to a particular source, no attempt has been made to cite the sources. The main sources used are given below.

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## (2) Other Publications:

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The Ministry of Finance (Treasury of Malaysia) Annual Reports:Various years

The MSE (later the SEMS and the SES) Gazette: 1961-1973

## CHAPTER THREE

### LITERATURE REVIEW - PART I EFFICIENT MARKET RESEARCH UPTO 1970

#### 3.1 - Introduction to Chapters 3-5

Chapters Three to Five of this thesis deal with the literature connected with research on the subject of stockmarket efficiency. Given that this field is one of the most intensely researched areas of economics, the number of publications which has to be reviewed is very large. As a result, it is felt that the thesis would be more manageable and readable if the literature review is divided into three separate chapters. Chapter Three deals with the research directly connected with stockmarket efficiency published upto 1970; Chapter Four deals with the same type of articles published from 1971 to the present date; and Chapter Five deals with articles which are less directly concerned with stockmarket efficiency but which are important to the unfolding of this thesis nevertheless. Even using this subdivision, each chapter would still be very long. They are therefore further divided into subsections.

##### 3.1.1 - Organisation of Chapter Three

Unlike research in other fields of economics, intensive research on market efficiency is a comparatively recent phenomenon. Intensive research only became possible with the advent of large high speed computers. Apart from a few notable exceptions, most of the more important research papers on the subject were only published after 1959. In effect, this chapter will be dealing with articles which were, in the main, published in a twelve year period. However, even for such a short time span, one can note several important changes in the nature and direction of the research carried out, such that by the end of the Sixties, the emphasis of the main bulk of research carried out had become very different from the emphasis pursued at the beginning of that decade. The year 1965 could be taken as the watershed between these two subperiods of research.

During the first subperiod, much of the research was of a statistical or "technical" (in the stockmarket sense) in nature. In those years, academics were still inclined to think of the stock price series as randomly generated processes and the Efficient Market Hypothesis was still known under its previous name of Random Walk Hypothesis (RWH). The main efforts were therefore directed at trying to prove that this was indeed so. The paper by Fama (1965) is typical of the research of the period. However, after 1966, with the gradual acceptance of the information based model of stock price behavior, there was a rapid increase in the number of papers that were published examining the efficiency of the market in terms of its strong or semi-strong form. And for various reasons which will be examined later in this paper, there was a gradual decline in the number of papers examining the technical aspect of market behavior (or the weak form tests as they came to be known later) such that by the end of the decade, only several papers of note were published yearly.

The papers which were published in the Sixties (with a few outside this decade but included nevertheless) therefore could be divided into three main categories. Firstly, there were the papers which were concerned with the overall aspect of the market, each laying down its author's hypothesis on the behavior of stock prices. Secondly there were the papers concerned with the statistical and/or technical tests on market behavior which reached their peak in the early Sixties. Finally, there were the papers concerned with the informational efficiency of the market in the strong or semi-strong form which started to appear in the second half of the decade. This is the way by which the materials to be discussed in this chapter are arranged.

The remainder of this chapter is organised as follows:-

3.2 - Important Papers on the Overall Aspects of the Market;

3.3 - Articles on Statistical and/or Technical Tests:

3.3.1 - A Discussion on the Basic Principles of Technical Analysis

3.3.2 - Efficiency Tests using Approximations to Trend Analysis

3.3.3 - Efficiency Tests using Approximations to Structural Analysis

### 3.4 - Publication on Semi-Strong and Strong Form Tests:

3.4.1 - Research Related to the Semi-Strong Form of EMH

3.4.2 - Research Related to the Strong Form of EMH

## 3.2 - Important Papers On The Overall Aspects of Stock Price Behavior

There were not that many papers of this category published. The six papers chosen demonstrate quite clearly the development of thinking in this field during the decade.

MANDELBROT(1963) The early work of Kendall, Osborne and Moore showed clearly that there was little serial dependence in the first difference of price series for various commodities, including stocks. However, it also became clear that the distribution of the logarithm of first difference of prices did not closely conform to that of a normal distribution. Since at that time, academics were still thinking of stock prices as being generated by a random process, it was obviously quite disturbing that in reality the first difference of stock price series did not conform to the shape of a normal distribution as expected. Attempts were therefore made to find an explanation for this failure and such attempts fell into two categories. Some, as exemplified by Cootner (1962), accepted that there was no reason why it should do so. The distribution of stock prices may not be generated by a random process and thus they would not conform to a normal or any other type of probability distribution. Others, led by Mandelbrot and Fama, sought to uncover another probability distribution which would fit more closely to that which is exhibited by stock prices.

The problem with the distributions of stock prices is that they are leptokurtic compared with normal distributions. They are so leptokurtic that it is very unlikely that they can be normal distributions (as shown by Fama in his article of 1965). Mandelbrot postulated that the distributions were Stable Paretian rather than normal. Stable Paretian distributions belong to a family of probability distributions of which the normal distribution may be

regarded as the extreme case. One of the characteristic exponents of Stable Paretian distribution is known as ' $\alpha$ ' which measures the height of the distribution in the tails of the density function. A normal distribution has an  $\alpha$  of 2 while the stable Paretian family has an  $\alpha$  of between 0 and 2. The most important characteristic of a distribution with an  $\alpha$  of less than 2 is that it has an infinite variance. Using the time series of cotton spot prices, Mandelbrot demonstrated graphically that their distributions closely conformed to that of a theoretical Stable Paretian distribution with an  $\alpha$  of 1.7. Mandelbrot therefore came to the conclusion the distribution was indeed Stable Paretian. He therefore deemed that the Random Walk Hypothesis be upheld although the distribution of successive stock price changes did not conform to a normal distribution.

FAMA (1963) In this companion article to Mandelbrot's, Fama gave strong support to the hypothesis that commodity price distributions were Stable Paretian. In addition, Fama discussed the important properties of Stable Paretian distributions and their implication to investors. This work is also notable because he was the first person to offer an explanation for the random behavior of stock prices. He postulated that the changes in prices were caused by the arrival of new information regarding the value of the underlying stock. The distribution of the stock price changes would be in close conformance to the arrival pattern and the effect of the information received. If the arrival of such information were Stable Paretian, the distribution of stock price changes would also be Stable Paretian. This hypothesis was to be the first appearance of the concept of the information based model of stock price behavior. This will be discussed in detail in a later section of this chapter.

If stockmarket research were to be diverted to the direction taken by Fama and Mandelbrot, it could be said to be heading towards a dead end. However, not all academics at the time were persuaded by their line of reasoning. Cootner strongly criticised Mandelbrot in his "Comments" on the Mandelbrot's paper published in 1964. He felt that Mandelbrot's work was over casual and graphical and thus not adequately rigorous. Secondly, he pointed out that daily spot cotton prices were used rather than futures prices. Cootner contended that it was a well known fact that spot prices were notoriously volatile especially around harvest time because of the low level of physical stocks in hand. Spot prices therefore are not a good representation of stock prices. Mandelbrot's paper also failed to address the



question of the change in the leptokurtosis of stock prices as the differencing interval is changed from one week to longer periods brought out in Cootner's earlier paper (1962).

FAMA (1965) This monumental article can be divided into three major parts:-

- (1) A description of the meaning, the necessary conditions for, and the implications, of random walk;
- (2) A careful examination of the theoretical and empirical evidence for a probable shape of the distribution of stock prices; and
- (3) An extensive series of tests to show the validity of the of random walk Hypothesis.

The third part of the article appears to be the main purpose of the article and will be examined in detail in the next section. The first two parts of the article constituted a strong support for the hypothesis that distribution of stock price changes conform with the Stable Paretian distribution, hence the random walk hypothesis can be upheld. This strong support for the random walk model was at the end of an era. It demonstrated the thinking of the majority of the researchers at the end of the first phase of the development of the EMH. Fama's next well known article, published a mere five years later would have shown his moving away from a pure random walk model towards an information based model.

In this article, Fama foreshadowed the movement away from a dogmatic random walk model to a more practical information based model. Early in the article, he made the distinction between statistical independence of successive price changes and practical independence. He admitted it was most unlikely that perfect statistical independence existed. He accepted that the fundamentalist's concept of the existence of an intrinsic value around which the market price of a stock would fluctuate may be valid. However, the important question to be asked was whether anyone could benefit from such random movements around the intrinsic value. In the real world, it was possible for the intrinsic value model to co-exist with the random walk hypothesis. In fact, it was even possible or even likely that there were superior chartists who could detect the existence of any dependency in stock prices.

But in a world of uncertainty, it would be difficult to know the exact intrinsic value of any one share (that is, the intrinsic value could be masked by a big noise item). Besides, the intrinsic value of the share would change with time. It would take a very superior analyst to know what the exact intrinsic value of a share was at a given time. However, it was very unlikely that the superior analyst could take advantage of his knowledge (if he existed at all) for a long period. For his very action would be largely self-defeating because his action would create dependencies in the price series which would be detectable by other superior chartists. The implication of the random walk hypothesis was that for the vast majority of the market participants, it would be quite pointless to do any analysis.

Given the conclusion of the first part of the article, it is strange that Fama should proceed with the second part. If the successive price changes are indeed practically independent, it would seem to be immaterial what type of probability distribution the time series conform to. The clue may lie in a statement about one property of the Stable Paretian distribution in his article of 1963 which was repeated in the present article. Fama pointed out that if the distribution was indeed Stable Paretian, the distribution would have infinite variance. This meant that the risk faced by the investors would be much greater than if the distribution was Gaussian and it is possible that Fama wanted to emphasise this risk. In the remainder of the second part of the article (Section III and IV) Fama attempted to demonstrate the validity of the Mandelbrot hypothesis. As discussed previously, the debate as to whether the distribution of successive price changes conforms with the normal or Stable Paretian distribution would lead into a blind alley and there is therefore little point in discussing it here.

BAUMOL (1965) Although this short book was more concerned with economic efficiency in terms of perfect capital allocation by correct pricing in the stockmarket, it still made several important points regarding stockmarket behavior which were in the same direction as the hypothesis postulated earlier in this thesis.

Firstly, the book strongly denied that the stockmarket could ever be a perfect market in the Walrasian sense with the supply and demand perfectly matched through an auction type mechanism to arrive at the equilibrium price. The book pointed out that apart from anything else,

the supply of stocks at any one time was inelastic while the demand could vary greatly. Over the short run, there must be another mechanism for bringing about the equilibrium. The book offered strong evidence that the specialists played the role of the market makers in the short run and from this process did earn considerable profits from their unique knowledge. Baumol made the point that the fact that the specialists could make a profit must mean that, to a small extent at least, prices were not free to move in a completely random manner. It is interesting to note that Cootner (1962) and later Grossman and Stiglitz (1980) extended this line of reasoning to cover, in addition, the situation of the knowledgeable investors who could extract an 'economic rent' from the market through their superior knowledge and lower cost of search for information.

Secondly, the book pointed out that the market could also be inefficient in the longer run, contrary to the then available evidence. Although the book could offer no rigorous proof of such assertion, again its line of reasoning has been echoed by other writers of the field. Baumol was of the opinion that the majority of the market participants were prone to highly emotional response to news. He suggested that the universe of available stockmarket information was so vast that the process of correct price determination would be very difficult for most of the market participants. The market therefore tended to "clutch at straws" and to respond emotionally to the appearance of news. The market, contrary to what one's commonsense may suggest, may actually produce a unified response to the appearance of a piece of news even though the response may not be economically rational. In support of this, Baumol suggested that Schelling's "focal point" theory may have application here. Many people, though not in communication or acting in concert, could produce the same response to a given stimulus. Such collective response could often be wrong and would provide opportunities for knowledgeable investors. This is in line with the fundamentalists' approach to investment and is also close to the Keynesian "what the average opinion believes the average opinion to be" model of stockmarket behavior. In support of this, Baumol cited the case of the severe price drop at the news of President Eisenhower having suffered a heart attack. This collapse, according to Baumol, was caused not so much by the fact that the market collectively thought that his heart attack would result in the diminution of stock value but by the fact that the participants thought that the market would collapse at the news; the collective action produced the self

fulfilling effect.

Baumol also suggested that the diffusion of information throughout the market could not possibly be instantaneous. It would thus be possible for professional investors to reap abnormal profit from having first access to the news. This hypothesis (in the first part certainly) was to be proved right many times by later researchers examining the speed of stock price adjustment to news.

SAMUELSON (1965) Samuelson addressed the theoretical problem of the behavior of commodity futures prices. Since stock prices closely resemble commodity futures prices, his work is applicable to the study of stock price behavior as well. In this writer's opinion, Samuelson's article was the most significant in this era. It probably had very powerful influence on the thinking of the researchers of the time; shifting the direction toward the information based model.

Samuelson set out to prove that it was unimportant that commodity prices should fluctuate in accordance with some probability function. It was perhaps a lucky accident that prices should conform so closely to one theoretical distribution or another. There was also very little reason why there should be so little serial correlation in price series, again probably another lucky accident. Nor did it matter that the price movements should resemble that of a random walk. In fact, from an economic viewpoint, there was every reason to think that they should not since the prices of commodities were unlikely to be completely unbounded in their movements.

Samuelson believed that the movements of commodity futures prices should resemble a martingale, or the so-called 'fair game' model. (At this point in the development of his hypothesis, he ignored the question of futures premium.). This meant that the present price of a commodity was the best possible forecast of its future price and it would therefore be impossible to reap a profit from the knowledge of the past prices alone. He started with two basic assumptions:-

- (1) The expected value of a spot price sometime in the future (i.e. the terminal spot price) is the sum of all the probabilities of such spot prices in the future upto that time; and that these probabilities are independent of the past prices; and
- (2) The market value of a commodity futures price is the result of

the competitive bidding process of the market arising from the market's collective judgement of the expected value of the terminal spot price as defined by the first assumption.

Given these two assumptions, Samuelson then showed that the best possible estimate of the terminal spot price of a commodity was the current price of the futures of that commodity. And the expected deviation of the terminal spot price from that best current estimate would be zero.

After proving the validity of his model for the specific case, Samuelson went on to apply his model to the general case where an allowance has to be made for the opportunity cost of the money tied up in the commodity futures. He called this cost "safe interest" and this can be thought of as its more modern equivalent of "risk premium". By adding a multiplier  $(1 + R)^T$  (where "R" is the "safe interest rate", "T" is the time period into the future and "<sup>^</sup>" stands for "raised to the power"), he allowed for the computation of the necessary premium which commodity futures price would command above the spot price. With the multiplier included, his model of commodity price can no longer be regarded as a martingale since prices were expected to rise into the future. The correct name of the model would be a submartingale with a drift.

The importance of Samuelson's work has been previously mentioned. In the late Sixties researchers in the field increasingly realised that it was not very important what shape the ex post price distribution took. What was important from the economic viewpoint was whether, ex ante, anybody could make a superior return from the stockmarket. Although Samuelson's model is concerned only with the expected value of a commodity's price sometime in the future given the knowledge of its past prices, it is a natural step to extend this model to include knowledge of other information sets as well. From this beginning, the model of the information based EMH model developed such that Fama's third well known article published in 1970 would present the EMH in its fully fledged form.

FAMA (1970) This lengthy article may be taken as marking the watershed of EMH research. Fama's article is important not because of any major discovery, but because it drew together much of the previous work carried out and produced a unified theoretical basis for future research, a common set of terminology and a fairly



standardised set of methods. It is in essence a review article which re-examined both the empirical and theoretical evidence in support of EMH. The article may be divided into two major parts, the first being a review of the theoretical basis for EMH and the second being a review of the evidence in support of EMH. Only the first part will be discussed here since the rest of this chapter will be doing almost the same as the second half of his article, except that the former will be on a much bigger scale.

In his review of the various models of stock price behavior, Fama gave his support to what may call the "information" based model of price behavior. This model is in fact a class of models which share the description provided by the expression below:-

$$E(\hat{P}_{j,(t+1)} \mid \Phi) = [1 + E(\hat{r}_{j,(t+1)} \mid \Phi)]P_{jt}$$

In words, this expression states that the expected future price of a security given the set of information,  $\Phi$ , which it is assumed to reflect, is equal to the current price multiplied by the expected equilibrium return that can be expected given the current available information. The information set,  $\Phi$  which the security price is assumed to reflect is left undefined in the first instance for Fama realised that not everyone would agree on the degree of omniscience of the market.

Thus EMH proponents may not all agree as to what is the information set which is fully reflected in the price, but they can agree on the above expression. In the same article Fama also defined the different information sets which could be thought of as being reflected in security prices as the Weak Form Information, the Semi-Strong Information and the Strong Form Information. The exact definition for each of these sets had been given earlier in this thesis and will not be repeated here. The information sets (either mutually exclusive or non-mutually exclusive) that can be reflected in the price are of course not limited to these three sets. The random walk model which was previously widely accepted can be thought of as belonging to this class of model. In this case, the information set which was thought to be reflected in the price of a security is the type of information which has a random arrival pattern. This part of Fama's proposal had been given much less prominence by workers in the field than his definition of the 'three forms' of information set. The researchers have largely stayed with this categorisation of information set until



today. As will be shown later in this thesis, this form of thinking is believed to be over rigid. Not all weak form information would entail the same degree of difficulty in uncovering. A market could thus reflect a certain type of weak form information but not another and so on.

The inadequacy of this aspect of Fama's model would become more clear as the Seventies progressed. However, at the time of its publication, it seemed to be on the whole very adequate although there were a few dissenters; the atmosphere was generally favourable as will be seen in the next two sections.

### 3.3 - Articles on Statistical and/or Technical Tests

#### 3.3.1 - BASIC "PRINCIPLES" OF TECHNICAL ANALYSIS

The technical approach to stockmarket analysis and security valuation is the oldest method practised by market participants. Essentially it is based on the belief that the price of a given security is dependent on supply and demand and has very little to do with its intrinsic value. Pinches (1970) summarised the technical analyst's view of the market into the following three statements:-

(1) Market price depends on supply and demand which at any one time reflects hundreds of rational and irrational considerations: facts, opinions, moods, and guesses about the future.

(2) (However,) Disregarding minor fluctuations, market prices move in trends which persist over an appreciable length of time.

(3) Changes in trend represent a shift in the balance between supply and demand. However caused, these changes are detectable "sooner or later in the action of the market itself".

Thus technicians believe that stock price changes are dependent in complete contradiction to the belief of the supporters of the Random Walk Hypothesis. It is not surprising therefore that the first papers published in defense of RWH were articles seeking to overthrow the ideas of technicians. As had been previously pointed out in Section

1.2.3, it is by no means easy to disprove the ideas of technicians because many of the technicians' methods are not readily testable. Many of the tests which were purportedly tests of technicians' methods were not good approximation of the real methods.

Technical analysis methods can be divided into two major categories - Trend Analysis and Structural Analysis. Trend analysis seeks to determine the future direction of a security's price (or the market as a whole) by analysing its past movements based on the belief that trends are persistent and such persistence can be predicted from past prices. Structural analysis seeks to determine the future direction of a security's price by analysing the sentiment of the market participants and the balance between the optimists (the bulls) and the pessimists (the bears) based on the belief that the sentiment and balance of power in the market place leaves detectable traces in the form of unusual changes in other market variables. However, to a certain degree the boundary between these two types of analysis is blurred and most technicians tend to use both types of methods in combination. This section separates them in order to facilitate the discussion of this complex subject matter.

#### (A) Trend Analysis

Nearly all the methods of trend analysis currently in use are based on the Dow Theory first proposed by Dow in 1921 and then re-presented by Rhea in 1932 in a more complete form. Although the Dow Theory, as it was originally presented, was meant for the analysis of stockmarket indices, it is now generally applied to individual security prices as well. The Dow Theory has two important features:-

(1) The market (or security prices) has three movements:-

(a) Primary Movements - These last from One to Three Years on the upward trend and slightly shorter period on the downward trend;

(b) Secondary Movements - These last from Six Weeks to Six Months for a complete cycle; and

(c) Minor Movements - These last from a few hours to several days and cannot be predicted. They are unimportant from the point of view of the technician.

(2) The price patterns determine the trend:-

Upward trend is indicated if the secondary movements result in successively higher peaks and troughs. The converse applies if successive peaks and troughs are lower.

Based on these two major ideas of the Dow Theory as well as several other minor concepts, technicians have, over the years, developed a large number of methods for predicting future price trends. They can be grouped into :-

(1) Primary Trend Determination - By the use of medium term moving averages of varying lengths and long term price cycles.

(2) Secondary Trend Determination - By the use of various chart patterns such as Channel, Rectangle, Triangle and other trend patterns as well as specific Price Patterns ( Head and Shoulder, Double Top and Bottom, Saucer etc.)

#### (B) Structural Analysis

In structural analysis, technicians attempt to decipher the sentiment and the balance of power between the optimists and the pessimists by studying market variables other than price. For example, it is believed by technicians that if volume of shares transacted were to rise each time the market declines for several cycles ( this is the so-called accumulation pattern) followed by a decisive breach of the previous peaks, the market would rise sharply shortly afterward. Of the methods practised, volume is probably the most important. However, not only are there myriads of methods involving volume data, they are also seldom used by themselves. They are usually used in combination with price and/or other data. As such this is not the place to describe them. However, the other methods are relatively straightforward and they are known under the following names:-

(1) Breadth - This method depends on the belief that market advance or retreat tends to take place over a broad front. If an advance is not broadly based, its progress would be shortlived. The converse also applies to market retreat.

(2) Momentum - This method is based on the belief that the market in its movements is like a train. It takes time to build up speed and

similarly it takes time to slow down.

(3) Relative Strength - This methods applies to individual stocks or group of stocks. It is based on the belief that if the price of a stock is increasing faster than the rest of the market, it will continue to rise faster until such trend is broken.

For the remainder of this section, we shall be examining the various articles published during the Sixties on various tests carried out on the validity of technical analysis as an approach to investment. We shall both examine how closely the methods tested duplicate actual practitioners' methods and the validity of the conclusion reached. One important point that ought to be made in the first place is that most professed technicians claim that they do not work from a single method but rather their decision to buy or sell is usually arrived at after considering the results of several tests.

### 3.3.2 - EFFICIENCY TESTS USING APPROXIMATIONS TO TREND ANALYSIS

Although early work was carried out by Bachelier and Cowles respectively in 1900 and 1937 on the behavior of securities prices, they were largely ignored until the Fifties when a resurgence in research in this field took place. During the Fifties and early Sixties, the research that was carried out can be characterised as being largely experimental in nature in the absence of an accepted theoretical description of security price behavior.

The first group of articles to be discussed in this section are articles largely concerned with statistical tests for independence in successive price changes and as such they cannot be regarded as direct tests on the technicians' methods. However, they laid the groundwork for the emergence of the RWH which was to contradict the long held ideas of the technicians.

#### (A) Serial Correlations and Similar Statistical Tests

KENDALL (1953) This was the first work to show empirically that the first difference in the time series of prices was serially independent. Kendall's original purpose was to discover the presence of trends in price series. In all, the statistical analysis of 22 different time series was carried out. The time series were made up

of 19 weekly stock indices (1928-1938), weekly and monthly wheat prices (1883-1934) and monthly cotton prices (1816-1934). The main conclusions reached were:-

- (1) The first difference in wheat prices appeared to follow a normal distribution;
- (2) Stock indices had similar serial behavior as commodity prices;
- (3) The random changes of these series from one period to the next were so large as to swamp the systematic effect;
- (4) It was difficult to distinguish between a random walk and one with a weak systematic effect; and
- (5) Aggregative stock indices had greater serial correlation than their components.

Apart from being the first modern worker in the field, Kendall was also notable in that he was the first person to introduce the concept of "Random Walk" into stockmarket research.

OSBORNE (1959 AND 1962) He was the first person to postulate a model for stock price behavior, equating it with the movements of very small particles in fluid while being acted upon by random small forces. He was also the first person to use the logarithm of the first difference rather than the absolute difference itself. This crucial change led to the obtaining of a distribution of differences which was more or less symmetrical about the mean. This naturally led him to compare the distribution with the normal distribution. Osborne showed that the logarithm of the first difference when graphed onto normal probability paper closely resembled that of a normal distribution. This led him to conclude that the stock price movements were probably random in nature. He was also the first person to study the semi-quartile range of the first difference of successively longer differencing periods for individual stocks. This work showed that the size of the variance increased at a rate that was proportional to the square root of the time difference. These two characteristics led him (as a physicist) to speculate that the movement of stock prices may have the same characteristics as the movements of small particles in a fluid while being acted upon by small forces (Brownian Motion). Since the two types of motion showed such close similarities, he concluded that the movements of stock prices must be random as well.

Osborne was also the first person to study the relationship between

individual stock price movements and those of the market as a whole. He noted that although the "rate of diffusion" (i.e. the rate of increase in the variance over time) differed from stock to stock, all of them were proportional to the square root of the time, thus foreshadowing the work of Sharpe and others on the systematic aspect of stock price movements.

In his second paper however, Osborne retreated somewhat from his previous position. In it, he expressed some doubts about the random nature of stock price movements. He noted after a more comprehensive study that the stock price movements acted as if the Brownian motions were constrained by some reflecting barriers. In addition, he noted evidence of "clustered" activities. He therefore concluded thus, "In general, the picture of price motion as simple random walks is supported quantitatively; qualitatively there are substantial departures from this simple picture".

MOORE (1962) This was the first systematic statistical analysis of weekly serial independence of stocks on the NYSE. Moore conducted tests on the S&P Index as well as 30 randomly selected stocks. He found that while there was a slight positive serial correlation for S&P 500, 22 of the 30 stocks showed negative serial correlation. Although in both instances, the amount of correlation was not significant, the number of stocks having negative serial correlation itself was significant. One of the explanations he offered for the existence of negative serial correlation was that the market could correct itself after the occurrence of a large random "error" item in the next period. While it is difficult to pinpoint any significance in this, his reasoning is very close to that offered by Weintraub (1963) in that there were floor traders ever ready to take advantage of "inefficiencies".

WEINTRAUB (1963) He applied Kendall's method with a slight modification to take into account the real world situation. He had noted that professional floor traders made large profit speculating on short term price changes. They made enough profit for their seats to be worth thousands of dollars on transfer. He therefore sought to use a test close to their method. Instead of using the closing price of the next period for computing the first difference, he used the next period's highest (for uptrend) and the period's lowest for downtrend reasoning that the professionals would act close to this manner. He found significant serial correlation both betting with the



trend (0.69) as well as against the trend (-0.61).

FAMA (1965) Apart from its discussion on the possible shape of the distribution of stock price, this article contains three tests of price dependencies. They are, serial correlation, runs tests and distribution of successors to large values. The serial correlation tests produced much the same results as the previous tests carried out. It is notable that the serial correlations examined covered the periods of 1 to 16 days.

The runs tests were designed to look for persistence of stock price movements in the same direction. Again, the tests carried out were for runs covering periods of between 1 to 16 days. Fama found a very slight tendency for the one day runs to persist. But as the test was extended for successive runs of 4, 9, or 16 days, the persistence disappeared, and on average, the actual total number of runs conformed precisely with what one would expect from a random distribution.

The distribution of successors to large value tests showed the result that large changes tended to be followed by large changes, but of random sign. There also seemed to be more more bunching of large values than a random distribution. This result upheld the contention that the distribution of price changes seemed to exhibit very long tails as had been previously noted.

COMMENTS ON TESTS IN GROUP (A) Apart from the fact that the early researchers made the mistake of assuming price distribution as being normal, two things stand out from the papers discussed above. Firstly, the tests on serial correlation carried out were based on differencing interval of less than one month. This interval of differencing ignore the typical secondary cycle of 6-26 weeks where technicians are supposed to operate.

Secondly, even for the differencing intervals during which one would expect the greatest degree of independence, the picture of independence is by no mean as clearcut as some of the workers seemed to imply.

#### (B) FILTER AND MOVING AVERAGE TESTS

ALEXANDER (1961 AND 1964) Alexander pioneered the use of filter

rules to uncover weak form inefficiency, if any. Filter rules may be regarded as crude approximations of the most fundamental trading rule of technicians who believe that prices move in cycles. If this is true, one could make abnormal profit by buying just after the price of a stock has moved off the bottom of a cycle and selling soon after it has reached the peak of the cycle. Filter rules are supposed to mimic the action of a technician watching price charts to determine the bottom and top of price cycles. Under Alexandrian filter rules, the selling (or buying) of a stock is triggered off if and when the stock's price moves  $X\%$  from the top (or bottom) previously reached. When this test is applied,  $X$  is usually set at various values such as 1, 5, 10 etc.

In his first article, Alexander came to the conclusion that it was possible to make abnormal profit even after allowing for commissions by using filter rules. However, he included two serious errors in his methodology and these were later pointed out by Fama. Firstly, he used the closing price rather than the highest or lowest price reached during the trading period to determine whether the trigger point had been reached. Had the maximum or minimum period price been used, there would have been a lot more trading and would result in lower profit. Second, he used stockmarket indices rather than individual stocks and dividend payments were left out of the computation of total return. In his second article, he corrected the first bias but not the second and concluded that it was still possible to achieve abnormal profit before commission.

However, in a very comprehensive paper, FAMA and BLUME (1966) showed that after correcting the second bias, the probability of making abnormal profit even before commission was small. After commission was included, the probability of making such gain was very small indeed. There is now little doubt that the straight forward Alexandrian filter rules cannot produce abnormal profit once commission is taken into account.

COOTNER (1962) Cootner's well known "random walk with reflecting barriers" model of market behavior was proposed in this paper. Although this model is now over 20 years old, it is still often cited by researchers in the field. Through this model Cootner offered an explanation for the fundamentalist's and even chartist's view of market behavior wherein the price movements of stocks are constrained (within a channel in the technicians' case). According to the

fundamentalist's view, this constraint is the result of the limitation imposed by the existence of an intrinsic value around which the market price must move. From the technical viewpoint, the constraint is the result of the stock prices' tendency to move within trend channels. In Cootner's model, the participants in the market are divided into the informed and the uninformed. The informed have a much lower cost of search because they know what to look for and where. They also have a much better idea of what the future return is likely to be than the uninformed because of their superior knowledge. But their cost of search is not zero and they can only expect to profit from a search if their expected return is higher than the "market" expected return by their cost of search. Since the market is being assaulted by random arrival of news as well as being subjected to the buying and selling of the uninformed investors at all times, the price of securities would tend to drift randomly. The informed investors would "sit on the side line" as it were and would not take any action until the price has drifted far enough away from their expected future price either in an upward or downward direction. At this point, they would spring into action and buy or sell according to their own expectation. Their action would cause an increase in demand or supply and would alert other informed investors who would also move into action. Their concerted action would cause the price to "bounce" back from the low or high reached. Once the price has moved away from its low or high sufficiently, the professionals would withdraw and wait for further random drifts to place the price again being in a beneficial position. Cootner stressed that the "barriers" were elastic because not all professionals had the same expected future price. Nor does the model imply one fixed trend channel. As Cootner pointed out, there was little reason to expect that "the changes in the price expectation of the professionals should occur other than in a random manner". Over time therefore, the price would be composed of a number of trends each bracketed by relecting barriers within which the price would drift randomly.

The nett statistical result of such a model would be a price series which exhibits autocorrelation over the medium term as the price moves within a trend, excessive shorter term reversal as it nears the barriers and within the trend but away from the barriers, the price would be free to move about randomly. As Cootner himself admitted, it would be very difficult to conclusively demonstrate that this model is correct. This is partly due to the fact that the width of the trend channel is not constant and the lengths of successive trends are

not the same. However, in spite of these difficulties, Cootner believed he could provide evidence that the real world would be close to his model. In his paper, he described several series of tests, two of which are summarised below.

**Autocorrelation** If stock prices move within a trend, there should be a degree of autocorrelation. So long as it stays within the trend, the positive correlation would increase as the differencing interval is increased. Cootner's work appears to show that this was indeed so. At two week differencing interval, only one out of his sample of 45 stocks shows significant autocorrelation (at the 5% confidence limit) while 10 others show some degree of autocorrelation. At 14 week differencing interval, the number of stocks showing significant autocorrelation had increased to 9 while 26 others showed some tendency to autocorrelate.

**Modified Alexander's Filter Rule** Cootner reasoned that Alexander's filter rule did not work because they did not mimic closely enough the real method. Technicians do not consider the absolute difference between the current price and the previous high or low. They normally compare current price with the overall market situation by comparing it implicitly or explicitly with the trend. Cootner therefore modified Alexander's method by comparing the current price with the 200 day moving average. He compared the gain from five different trading rules using "buy-and-hold" as well as 0 and 5% trigger points for the two different trading strategies - "long only" and "long and short". His results show that the "long only" strategy at 5% trigger point had a very high probability of making abnormal gain even after taking into account commission. Furthermore, the risk of the "long only" strategy as measured by variance of the return was approximately 30% lower because during the time when the price of a stock fell below its moving average, the stock would be sold and the proceeds held in an alternative investment (T-bills?).

**VAN HORNE AND PARKER (1967)** They tested Cootner's moving average trading method and came to a very different conclusion. They applied the method to a random sample of thirty companies over a six year period from 1960 to 1966. (Cootner's sample were mostly for five years 1956-1960) They used three different moving average intervals; 100, 150 and 200 days and five threshold percentages; 0, 2, 5, 10 and 15. Thus it can be said that their method was much more comprehensive.

The results showed that none of the trading strategies was any better than the "buy-and-hold" strategy even before commission was included. Without another researcher replicating their work, it is not possible to offer an explanation as to how such different results were obtained. It is possible that the market behavior could have changed between the two periods. Another possible explanation is that the sample selection was bias in either of the tests conducted. As things now stand, the moving average method is an enigma.

### (C) CYCLICAL PATTERNS

GRANGER AND MORGENSTERN (1963) This work is notable because it was the first to bring a highly sophisticated statistical method from a non related field to stock price analysis. The use of spectral analysis appeared at that time to have settled once and for all the debate as to whether stock prices demonstrated any regular cycle. Granger and Morgenstern applied spectral analysis to the S&P common stock index from 1875 to 1952 and the DJIA from 1915 to 1958 (both series on a monthly basis).

The main conclusion which arose from this analysis was that over a short run (i.e. less than 24 months), stock indices did not seem to exhibit regular cyclical patterns. However, there were several peaks in the power spectra of these indices over the longer runs. There were indications of a 40 month cycle coinciding with the well known 40 month business cycles as well as annual cycles and their attendant harmonics at the 90% confidence limit. But the authors did not believe that they were significant.

This conclusion would be in conflict with the conclusion reached by Allvine and O'Neill (1980). The explanation for this conflict will be discussed together with this later paper in the next chapter.

### 3.3.3 - TESTS BASED ON APPROXIMATIONS TO STRUCTURAL ANALYSIS

There is a great dearth of articles on structural analysis compared with articles on trend analysis. A possible explanation for this is the great difficulty involved in approximating the various practitioners' methods in this area. Most of the methods do not lend themselves to be tested in a scientifically rigorous manner. The best tested method is the relative strength trading strategy from which it



appears that one ought to draw a conclusion which is in favour of market efficiency.

LEVY (1967) Levy was the first to test the relative strength strategy. This trading method depends on the wellknown Wall Street adage that a stock that is moving up well relative to the rest of the market will continue to do so until the momentum is somehow broken. The converse also applies. Levy's method depends on isolating those stocks that have performed well and track their subsequent performance after selection. His method consists of computing the 26 week moving average of all stocks in the portfolio and selecting those which have exceeded this moving average by X% for purchase and casting out those previously selected whose relative performance rank have fallen below a certain number, K.

Levy tested this method with X set at 5% and 10% and K set at 20 to 195 with a total of 200 stocks in the portfolio. Levy showed that his method would result in the trading portfolios providing a return of as much as 29.1% (X=5% and K=140 with high volatility stocks) nett of transaction cost compared with a return of 10.6% using a random selection method.

Jensen, in his "Comment" on the above article criticised Levy on four counts:-

- (1) The definition of return for the "Random Selection Policy";
- (2) The data and sample used may have built-in biases;
- (3) There was no proper treatment of risk;
- (4) There was an erroneous pricing method under the trading strategy used (cf Fama's criticism of Alexander).

In his reply to the above comment, Levy recalculated his previous results to take into account the last two criticisms and used another body of data to allow for the second bias. He claimed that his strategy would still yield supranormal return after these modifications. However, the next paper by Jensen and Bennington strongly refuted his contentions.

JENSEN AND BENNINGTON (1970) They replicated Levy's method and produced very different results. A very much larger body of data was used (29 portfolios of 200 stocks each) covering a very much longer period of time (1931-1965 divided into 7 non overlapping periods).



They showed that after the appropriate allowance for risk using CAPM, the relative strength strategy consistently produced a result which was worse than a buy-and-hold strategy. It would seem that this method when applied to very large body of stocks over a long period of time has very doubtful use.

Jen in his "Discussion" on this paper expressed some sympathy for Levy's method. He felt that this method with its small number of stocks in the portfolio was probably much more useful when practised by the typical small independent traders with small portfolios. The large mutual funds, should they try to practise this method with a small number of stocks would find themselves too large a factor in the market. For them, Jensen and Bennington's method would be a close approximation of their situation. With regards to tests on market efficiency as a whole, he had this to say, " Both kinds of tests (i.e. statistical and empirical tests) can be criticized on the ground that the statistical procedure used cannot disprove the hypothesis that, for a limited period of time, price changes are not random for certain stocks or even a significant part of the market in response to some new information. Nor can they disprove the hypothesis that (even if) price changes are random for a long period but actually (is caused by) either mean or variance, or both, having shifted within that period in response to new information."

GODFREY, GRANGER AND MORGENSTERN (1964) This was a follow-up article to Granger and Morgenstern (1963) on the use of spectral analysis for testing cyclicalities in stock prices. In it is the only well known reference to a test on the correlation between volume and price of stocks. The authors found that the correlation between price and volume series was rarely greater than 0.1 while the typical value was 0.02. The authors also remarked that, " As a matter of passing interest they are the lowest estimates of coherence from actual observations of economic processes known to any of the authors". This was a truly surprising result in view of the long held belief on Wall Street that price and volume are closely related. Most observers of the stockmarket scene, even casual observers, would have noticed that volume and price do seem to move and down together during bull and bear markets. Without further collaborative testing, it would not be possible to comment on this one single test. However, one thing is quite clear - the relationship between price and volume is neither simple nor positive according to the belief of technicians. It would be very difficult to design direct tests which approximate

practitioners' methods. This is probably the main reason why there have been so few tests on this relationship.

### 3.4 - Publications on Strong and Semi-strong Forms Tests

The second half of the Sixties was a most fruitful period for efficiency research. There was almost what one may call a flowering of articles on research on the information based model of EMH. Many of these articles are still cited regularly today and many of them could be regarded as most significant because they established the now accepted methodology of efficiency testing in their respective area. The articles to be discussed are divided into those dealing with the semi-strong form information and the strong form information although they were not known as such until after this era was over.

#### 3.4.1 - RESEARCH RELATED TO THE SEMI-STRONG FORM OF EMH

It is well accepted by most students of the stockmarket that the value of a stock is dependent on its expected stream of future earnings or dividends. The record of earnings previously obtained or dividends paid and the latest earnings (or dividend) of a firm can be reasonably assumed to convey a certain amount of information to the market about its future expected earnings (or dividend). If this assumption is correct, a new earnings figure must constitute an important piece of information processed by the market to evaluate the worth of a stock. As a result of this line of thinking both the predictability of a firm's earnings and the effect of its earnings announcements on the price of its stock have been subjected to close scrutiny by researchers.

Many researchers had carried out work examining the predictability of future earnings streams. The work of Little (1962), Lintner and Glauber (1967) and Ball and Watt (1972) (to be discussed in Chapter 4) appeared to have shown that the annual earnings series of firms follow a pattern that was close to a random walk or random walk with a drift. Later studies by Beaver (1968) and Beaver, Clarke and Wright (1979) seemed to indicate that the change in the price of a stock is

fairly closely related to the change of the EPS although the relationship may not be one-to-one. These findings lead one quite logically to the speculation that if one were to act fast on the receipt of abnormal earnings announcements, one could perhaps profit from it. The work of Ball and Brown, to be discussed next, which is arguably the best known in this field, seemed to strongly refute this speculation.

BALL AND BROWN (1968) It is highly significant because it established two "firsts" :-

- (1) It was the first study on the informational content of unexpected earnings changes and their effect on subsequent stock prices; and
- (2) It pioneered the use of the Abnormal Performance Index (API) to study the "pure" abnormal behavior of stock prices after the public receipt of such information by removing the market effect from the stock prices.

Ball and Brown (BB) reasoned that since historically about half of the variability of a firm's EPS was associated with economy wide factor, the market thus could have an expectation of a firm's next EPS based on its knowledge of the current economic performance of the country. If the actual EPS turned out to be very different from the market's expectation, there would likely to be an effect on the firm's stock's price (hence on the computed return on an investment in the company's stock). The relationship between a firm's EPS and the economy could be first established by using the OLS method. The results from the regression can then be used to establish the level of the expected EPS. (It is important to note here that the expected EPS so computed may or may not be the same as the real market expectation). A firm that had reported an EPS which was lower than the level established could be said to have suffered a Negative Earnings Forecast Error (or NFE) and one that had a higher than expected EPS would have suffered a Positive Earnings Forecast Error (or PFE). Logically, one would expect that the information content of an NFE or PFE would have some value for forecasting the stock's future price. That is, one could reasonably expect that a firm which has experienced a NFE to suffer a decline in its stock's price.

However, over the same period as the one during which the earnings information is received, the total movement experienced by a stock

cannot be wholly attributed to the earnings information since the movement of the overall market would have an effect on the stock's price as well. As King (1966) had previously shown, about 30-50% of the movements of a stock's price could be explained by the movements in the market. It is therefore necessary to remove the market's effect from a stock's price if one wishes to study the "pure" effect of the news of NFE or PFE. BB therefore adjusted the price of the stocks investigated by applying Sharpe's market model. The residual (i.e. pure) return which included both dividend and price changes was defined as  $V_{jm}$  which is given by the following expression:-

$$\hat{V}_{jm} = \hat{b}_{1j} + \hat{b}_{2j}[L_m - 1] - [PR_m - 1]$$

Where :  $L_m$  = Market Performance Index as defined by Fisher for the month of 'm'.

$PR_{jm}$  = Price Relative for the 'jth' stock for the month 'm'  
(Price Relative = [Closing price + Dividend]/Opening Price)

From this, BB defined **API** as :-

$$API_m = \frac{1}{N} \sum_{n=1}^N \prod_{m=-11}^M (1 + V_{nm})$$

Where: N = Total number of stocks in portfolio of sampled stocks.

API computes the change in the value of one dollar equally divided as investment in the sampled stocks j (where j = 1,2,3.....j) from the end of month -11 (i.e. 12 months before the earnings announcement) to the time M months afterwards.

Contrary to what one would have expected, the results of BB's study showed that at the point of the earnings announcement ( i.e. m = 0), the market appeared to have already incorporated much of the information associated with a NFE or PFE into the price of the stocks concerned. In other words, this study appeared to show that if a person were to act on the basis of public earnings announcements, he would not be able to make any abnormal profit. BB's study seemed to show that a stock's price would start to move in the direction of the forecast error upto 12 months before the public announcement.

However BB's study contained several major deficiencies which caused later workers to question the validity of its conclusion. They are:-

- (1) Annual earnings were used and the information content of the subsequent interim announcements was ignored;
- (2) The magnitude of the forecast errors was not considered, only their direction; and
- (3) Monthly prices were used for the study which could have masked shorter term movements.

Later workers, after correcting for these deficiencies, were able to show that the market was neither totally prescient nor was its reaction to forecast errors instantaneous. These studies will be discussed in the next chapter.

The next paper, although superficially appearing to be deal with the question of stock split, is actually more concerned with the effect of dividend announcements on stock prices.

FAMA, FISHER, JENSEN AND ROLL (1969) (FFJR) This is arguably the best known and most cited article in the field of stockmarket efficiency. The original purpose of the authors appears to be to test the long held Wall Street adage that stock splits increase the overall value of the firm. If this is true, it would be a sign of gross inefficiency. More specifically, they set out to discover the answer to the following questions:-

- (1) Was there any "abnormal" behavior surrounding stock splits ( that is, did the price of a stock move up around the time of the stock split announcement) ?
- (2) If there was abnormal behavior, could this be accounted for by the relationship between the split and some other fundamental variables rather than the split itself.

FFJR used the data surrounding a total of 940 splits of greater than 25% during the years 1927 to 1959. In order to isolate the effect of the split (if any) from the market effect, FFJR used an adjustment method that is slightly different from the API method previously described. They named their adjustment method Cumulative Average Residual ( or CAR). The main difference between CAR and API is that the former uses the logarithm of the price relative rather than the

arithmetic ratio. FFJR defined the return residual,  $U_{jm}$ , for the  $j$ th security for the month of  $m$ , as follows:-

$$U_{jm} = \text{Log}_e R_{jm} - \alpha_j - \beta_j \text{Log}_e L_m$$

Where:  $L_m$  = Market performance index as previously defined,  
 $R_{jm}$  = Actual return for the  $j$ th security for the month of  $m$ .

The Average Residual,  $u_m$  and the Cumulative Average Residual  $U_m$  could then be defined as follows:-

$$u_m = \frac{\sum_{j=1}^{N_m} \hat{U}_{jm}}{N_m} \quad U_m = \sum_{k=-29}^m u_k$$

The CAR for the sample is computed for the 30 months before and after the stock splits. The securities undergoing split are divided into three data sets - all stocks undergoing split; stocks undergoing split with concurrent dividend increase; and stocks undergoing split with concurrent dividend decrease. Their results could be summarised as follows:-

(1) For all splits, the CAR started to move upward well before the split announcement, as much as 30 months before. The upward movement was the strongest in the several months just before the announcement. The upward trend was stronger for stocks with a concurrent dividend increase than one without dividend increase.

(2) After the announcement, those stocks with dividend increase would show a CAR which was flattish for the rest of the observation period. Those stocks with concurrent dividend decrease would experience a declining CAR for about 12 months before the CAR flattened out and stayed that way till the end of the observation period.

FFJR therefore concluded thus. Firstly, stock splits per se did not seem to increase the market's valuation of the stock concerned. Secondly, prices had tended to move up well ahead of the split announcements which must imply that the latter could not be the reason for the upward movement. The more likely explanation was that the management of the firms concerned had tended to decide on splitting



after a period of superior corporate performance which had already been reflected in better price performance of its stocks. Lastly they concluded that part of the superior performance of the stocks could be attributed to the market expectation of increased dividend which usually accompanied stock splits. If the dividend increase did not materialise, the disappointed market would retrace some of the gain previously attained. It would thus seem that dividend increase or decrease could have informational value for stock pricing.

From these conclusions, as well as those based on Ball and Brown's work previously discussed, supporters of EMH strongly argued that the market was efficient in the semi-strong form because public announcements could not be used to gain abnormal profit. In hindsight, such a conclusion would seem to be over sweeping and premature. The deficiencies of BB's work have been discussed earlier. As to FFJR's work, to conclude that the market was efficient in the semi-strong form based on the evidence that it did not react to announcements of stock split would seem to be overly deterministic. It is hard to believe that a market as sophisticated as the American one would react positively to stock splits in the first place since they are manifestly not events of any advantage to the shareholders. It seems to this writer that in this study, the most important result is the market's reaction to the presence or absence of a dividend increase. Since dividend increase or decrease is a "stronger" form of information, the degree of efficiency of the US market is greater than what the test superficially shows. Owing to the fact that the first post stock-split dividend announcements do not occur at the same time, it is not possible to determine the speed of the stock market's reaction to the dividend information. Later researchers would carry out extensive work in this specific area. These work will be discussed in the next chapter. As we shall see, these studies were to show that in the case of several different types of semi-strong information, the market's reaction was quite slow.

GREEN AND SEGALL (1967) One of the more serious deficiencies of BB's work that has been pointed out was that annual earnings figures were used instead of quarterly ones. It would seem logical to conclude that the three interim announcements in between would have "given away" the coming news about the annual earnings figure. It would therefore not be surprising if the market did not react to the subsequent annual earnings announcement. However, Green and Segall's work seemed to contradict this commonsensical conclusion. Their

result revealed that the annual earnings figures appeared to be the more accurate forecast for the next annual figures than the interim earnings figures. Even the authors agreed that this result seemed "nonsensical". If their work is an accurate representation of the actual situation, it would seem that BB's work would be partially vindicated.

BROWN AND NIEDERHOFFER (1968) In a follow up article to the above, Brown and Niederhoffer came to the opposite conclusion. Using a much larger sample than Green and Segall, they concluded their study with this remark, "..... the best of the interim predictors was consistently better than the best of the annual (predictors) ..... interim reports, as currently prepared are useful in predicting annual earnings.".

Green and Segall, in two subsequent replies (1968 and 1970), failed to demonstrate convincingly that Brown and Niederhoffer's conclusion was in anyway inappropriate. It thus appears that interim results can be used as a better predictor of current year's earnings than the previous year's. This discovery was to lead to work by Joy, Litzenberger and McEnally, among others, which were to show that the market was not that efficient when dealing with earnings announcements (to be discussed in the next chapter).

#### 3.4.2 - RESEARCH RELATED TO THE STRONG FORM OF EMH

During the late Sixties, the idea that stock prices were reflections of the degree of understanding the market had of the available information gradually took hold among the academics. They then proceeded to explore the limit of such understanding. One of the earlier ideas to take hold was the possibility that market professionals, having a much better knowledge of the market, should obviously outperform the market as a whole. This section will examine three papers on this subject as well as their conclusions for appropriateness.

SHARPE (1966) This was the earliest paper to appear on the subject. As a matter of passing interest, it is perhaps revealing to note the lack of sophistication and the small size of the sample employed in this study compared with the next (Jensen's) which appeared a mere two years later. Sharpe examined the performance of

34 open end mutual funds during the years 1954 to 1963. He found that after making the appropriate adjustment for the riskiness of the mutual funds, the probability of the average mutual fund outperforming the market as represented by the DJIA, for the whole of the study period was about 0.01. He adjusted for the riskiness of each mutual fund by dividing the average annual return by the variability of such return (he called this the Reward-to-Variability Ratio or R/V Ratio). The R/V Ratio was then used as the standard of comparison between different funds and between them and the market.

Nor was the performance of the mutual funds consistent from year to year. He found that the rank correlation from year to year was only 0.36. Based on these results it would seem logical to conclude that mutual funds, in spite of their supposedly superior access to information, could not perform better than a broad market average. This was taken by the researchers at the time to mean that the market must have been very efficient in its ability to digest available information. This conclusion was given further credence by the next piece of research work.

JENSEN (1968) Jensen's follow up work in this area was much more comprehensive and it also introduced CAPM as a means of adjusting for riskiness of each mutual fund's portfolio. One of the stated purposes of this work was to measure return on an absolute rather than relative basis as was done by Sharpe using the R/V ratio.

Jensen's method was based on the computation of the residual item in the return of mutual funds after the market effect had been removed by using CAPM. He found that the residual item (which he called alpha) for his sample of 115 mutual funds for the period 1955 to 1964 had a range from -0.0805 to 0.0582 distributed almost symmetrically about zero. The mean residual return was -0.011 (i.e. about 1% worse than the market average) and the median -0.009. He also carried out the same computation for certain subsets of the sample and these gave similar result. He therefore concluded that it was most unlikely that mutual funds could perform significantly better than the market even gross of management expenses.

CRAGG AND MALKIEL (1968) This paper examined a different aspect of the professionals' ability to "beat the market". The stated purpose of this paper was to examine whether professionals in the field of investment could do a better job of earnings forecasting

than mere extrapolation. The authors also sought to discover the degree of consensus among the professionals working in the same area. Their study was based on the earnings estimates for 185 firms produced by 4 and 5 finance houses for the years 1962 and 1963 respectively. Their result showed that whilst there was a very high degree of consensus among the experts' forecasts, their accuracy was only slightly better than what could be achieved using simple extrapolation based on past earnings. They also discovered that PER were not good guides to the future performance of a firm. That is, firms whose stocks were selling for a high PER (because the market expected them to do well) did not seem to do significantly better than firms with low PER.

These studies and others like them, led to the general realisation that mutual funds, finance houses and other professionals in the field of investment did not have the ability to provide better forecasts or perform better in investment than the market as a whole. Many of the academics of the time therefore concluded that the market could even be efficient in the strong form. But the prima facie evidence available at the time was misleading. The fact that professionals could not outperform the market does not necessarily mean that it is impossible for anyone to outperform the market, a conclusion which would be warranted if one accepts the validity of EMH in the strong form. Later work on insider trading was to show conclusively that it was possible to make abnormal profit using specialised knowledge. The early methods used by the pioneers of market efficiency discussed in this chapter were to be further refined and tested throughout the Seventies. In many cases, it was found that the earlier conclusion was erroneous for one reason or another. These studies will be examined in detail in the next chapter.

## CHAPTER FOUR

### LITERATURE REVIEW - PART II EFFICIENT MARKET RESEARCH UPTO 1984

#### 4.1. - Organisation of Chapter Four

This chapter of the thesis will look at the research work carried out during a 14 year period from 1971 to 1984 (with a few outside these bounds) connected with market efficiency. As has been previously pointed out, a major shift in the research emphasis in this area took place during the early Seventies. With the wide acceptance of the information based model of market behavior, research - largely of an empirical nature - had become more focussed on how and at what speed the market would react to receipt of various types of information as well as on the limit of informational efficiency exhibited by the market. There were therefore relatively fewer papers of a theoretical nature published on the overall aspect of the market. There was also a shift away from research on the weak form efficiency of the market as most researchers appeared to be of the opinion that this aspect of the market is proven beyond reasonable doubt. The papers which will be reviewed in this chapters therefore will be largely connected with either explaining how the market attain informational efficiency or how efficiently a piece of information is treated by the market.

This chapter is therefore divided in several sections in order to simplify the organisation of a very large number of papers on the subject. Each section will deal with one particular type of papers in the following order:-

- 4.2 : Papers on the overall, theoretical treatment of market efficiency;
- 4.3 : Papers on the market's reaction to the CONTENTS of information received;
- 4.4 : Papers on the SPEED and RANGE of reaction of the market to



of information;

4.5 : Papers on other aspects of information processed by the market and papers on efficiency tests carried out in countries other than the US and UK;

4.6 : General views of several noted academics on market efficiency.

The above division is of course largely artificial. Its main purpose is to make more manageable a very large body of research for discussion. To a certain extent, the boundaries between the various categories of papers are blurred and certain papers could as well appear in one category as another.

## 4.2 - IMPORTANT PAPERS ON THE OVERALL ASPECT OF THE MARKET

The acceptance of the information model of stockmarket behavior naturally enough leads to questions being asked on how the market could correctly interpret the informational content of any piece of news and produce the best possible estimate of its effect on the future price of a security. While it is not necessary for the EMH to have a theoretical foundation, it would obviously strengthen the case of its proponents if there is a widely acceptable theoretical model behind it. Since the mid Seventies, there had been many papers postulating various models which either attempt to explain the attainment of stockmarket informational efficiency or refute such a possibility. Models which support the EMH would have to explain how is it possible for the market to attain efficiency in spite of the wide asymmetry in the knowledge of the market participants and the manifest impossibility of instantaneous dissemination of news throughout the market. As pointed out in Section 1.2, there have been many attempts to resolve the first of these two difficulties while the second problem is, up to now, still largely unanswered. This section will consider five papers concerned with the development of different models of stockmarket informational system. Two of these models are in support of the EMH while two are against with the fifth being taken from a related economic area. This section will attempt to examine the merit of each model and consider how they



compare with the model which is being proposed in this thesis.

VERRECCHIA (1979) This paper attempted to develop mathematically a model of informational efficiency in the face of the seemingly natural conclusion that the informed investors ought to be able to take advantage of their position and reap abnormal profit at the expense of the less informed. Verrecchia's model is based on the following assumptions about the investors' assessment of the dispersion of the return on share investment relative to the dispersion of the true return:-

- (a) Their assessments should be collectively unbiased;
- (b) Their assessments should be pairwise independent; and
- (c) Their assessments should have finite mean square.

Provided that these conditions hold true, the model would not require the existence of any informed investors for the market to be efficient. As the paper stated, "The dispersion in the prices (of the securities) will converge to the true underlying dispersion as the number of individuals who actively participate in the market becomes large." It is to be noted that the assumptions made concerning the stockmarket are very gross assumptions (which Verrecchia himself admitted). Firstly, it is not inconceivable that a large proportion of the market participants could be collectively biased in their assessment of the true return achievable from stockmarket investment (this is the position held by most fundamentalist writers). For example, during the technology "craze" of the late Sixties, such stocks were priced at a very high level. Secondly, even if the market is collectively unbiased, in order for the market's assessment to converge on the true price, the number of active participants has to be large. This situation may not be attainable in all sectors of the market. In those sectors with limited participants, the prices may not be a good estimate of the future prices. It is important to note that the concept of "participation in a sector" need not be limited to participation in a physical sector of the market, for example, closed end investment trusts sector. Limited participation can also occur in the case of, say, investing for the longer run. If the bulk of the market participants are interested in very short time frame, the available information on the superior return of certain long term investments may well be ignored by the majority of the market participants. In this case, the informed investors who are interested in the long run would be able to buy securities with long

term growth potential at a "discount". This is the position long held by many fundamentalists and the paper by Oppenheimer and Schlarbaum (1981) (to be discussed later in this chapter) seems to uphold this belief. This thesis therefore is inclined to take the position that Verrecchia's model, while applicable over a part (maybe even a large part) of the market, may not be applicable to all parts of a market (or all markets). It would seem that it is precisely in those sectors of the market which this model is not applicable that inefficiencies can occur.

BEAVER (1981a) Verrecchia's model was later expanded by Beaver to include the situation wherein there was a wide asymmetry of possession of knowledge among the participants. Beaver's model's basic postulate is that the universe of investment information is so vast and complex that each market participant could only possess a small piece of the the total available information. So, it could be said that there is no such thing as an "expert" on the stock market, who is in possession of such a large slice of information that he could make a better forecast of the future price of a security than the market as a whole. Furthermore, not only does each participant possess a small piece of the information available, he is also not completely rational in the action he takes after coming into possession of that piece of information (presumably because he does not have enough information to make a rational decision). Thus the market could be characterised as one which is populated by a very large number of people who each receives a small signal which is in addition garbled by a large noise item. The action taken by each participant subsequent to the receipt of that signal is idiosyncratically determined. Since by definition, the actions taken by the participants are collectively unbiased and independent, the idiosyncratic part of their actions is self cancelling. The end result of such collective action is that the "pure signal" on each security generated by the market comes through. Thus the market acts as an aggregator of all the information individually possessed and idiosyncratically acted upon to produce an efficient end result.

In support of this model of market efficiency, Beaver cited the case of the inability of the individual sportswriters of the Chicago Daily News in the years 1966-1968 to consistently produce better football result forecasts than their own consensus forecasts. Beaver's model is an obvious improvement on Verrecchia's but neither the assumptions made nor the parallel drawn between sportswriters' forecasts and

security price forecasts are very valid. Firstly, it must be pointed out that because the sportswriters are all supposed to be experts in their field, it is perhaps not surprising that none of them could do better than the others on a consistent basis. In the stock market, we have the overall situation of experts competing with non-experts. While it is true that for some sectors of the market, there are enough experts in competition to make the market efficient, this may not be true for all sectors. Secondly, whilst it is true that the overall universe of stockmarket information is vast (certainly a lot more vast than the universe of football information), it is not always true to assert that an investment decision requires the calling upon of the whole universe. Occasionally, an investment decision entails the weighing of a fairly simple piece or set of data, for example, the occurrence of a large earnings forecast error for a particular stock. In such instances, it is not the information processing ability that is of importance but the speed with which such information is received and that of decision making.

GROSSMAN AND STIGLITZ (1980) This is a follow-up paper from GROSSMAN (1976) and its conclusion is very much stronger than the first paper. This paper is concerned with demonstrating that it is "impossible" to have an informationally efficient capital market. The paper begins by presenting certain conjectures concerning the model of equilibrium in a competitive market where the cost of search for information is not zero. Under this model, the informed and uninformed investors coexist in the market. An investor is said to be free to choose between staying uninformed or becoming informed. In the equilibrium situation, the cost an investor incurs to become informed is fully offset by the extra utility he would gain by becoming informed. At the equilibrium, he would be indifferent as to one or the other.

This paper shows that for the specific case of investors having constant absolute risk-aversion, it would not be possible to achieve an equilibrium if the the market is fully efficient. If the market is fully efficient, the price would convey all the information regarding security return. If that is the case, there would be no incentive to purchase information and everyone would desire to become uninformed. On the other hand, if everyone is uninformed, the price would convey nothing. Hence everyone would desire to become informed. Under either situation, the market would break down completely with zero trading. The market can only achieve competitive equilibrium if there is noise

in the system and there is utility to be gained from doing research. Only when traders in the market hold different beliefs and are willing to act on those beliefs, is there a possible market. But the intriguing question that needs to be asked is : "Do all participants in the market incur the same cost in information search?". Cootner, in his paper of 1962, obviously did not think so. While the case could be made for the US that given the long history of the stockmarket and the high level of investor literacy and the widespread availability of investment information, there may not be that much difference in the cost of search. But in a less immature market, there would be greater possibility that the cost of information search would not be the same for all participants. If the cost of information is not uniform for all participants, then at the equilibrium point of this model, there would be some traders who could obtain abnormal profit.

AKERLOF (1970) This paper proposes a model which was originally developed for use in economic situations other than the stockmarket but which appears to have interesting possibilities when used to explain the market information system. Akerlof's so-called "Market For Lemons" model was developed to provide an explanation for the process of price formation in a market where there is an unequal possession of knowledge between the buyer and the seller regarding the quality of the goods being offered for sale, as the case of the used cars market. In such a situation, the seller of the car possesses far more knowledge regarding the car than the intending buyer. Since there is a risk that the buyer could be buying a "lemon", he would only offer a price which would protect him in the event that he really does get a lemon. Thus the price of the used cars as a whole would be driven down to a level which can be upheld by the average quality of the car on offer. An extreme development of this situation can take place if the sellers of non-lemons are not satisfied with the price offered and withdraw from the market all together. The withdrawal of the non-lemon sellers would imply a drop in the average quality of cars left on the market and this would cause the buyers to lower their offered price even further for fear of getting the lemon among the lemons. This process can lead to the eventual disappearance of the market.

This process of pricing in a situation of non-symmetrical possession of knowledge could be applied to the stockmarket with a modification. The stockmarket is not made up of only knowledgeable

sellers and non-knowledgeable buyers. Instead, it is made up of both knowledgeable buyers and sellers as well as non-knowledgeable buyers and sellers. In such a situation, the less well informed would always be in a disadvantaged position. They could conceivably be always trying to sell higher or buy lower than what is justifiable by the true expected return. Compared with the informed investors, it is possible that they would need to wait for more confirmatory signals before making up their minds. If we assume that the knowledgeability of the market participants follows a continuum rather than two distinct classes and that the action of the most knowledgeable participants can be thought of as the confirmatory signal required by the next most knowledgeable, it is possible to propose the following adaptation of Akerlof's model.

At the equilibrium situation, a new piece of information concerning a stock is received. This piece of information is so small that only the most knowledgeable realises its meaning for improving (or deteriorating) future stock return; he therefore moves in and makes his trade. His buying together with additional information which would be trickling in would alert the next most knowledgeable investors and they would in turn follow. This would trigger more action down the line of less knowledgeable investors until eventually even the most ignorant will have participated in the buying. The more knowledgeable are therefore in position to take advantage of the less knowledgeable by buying or selling before the latter. If it could be shown that the price of stocks responds slowly rather than instantaneously to the input of a new piece of information, this model would have some validity and the market could not be considered ultra efficient. As will be shown later in this chapter, even the US market does not always react instantaneously to new information. It would thus seem that such a model of market behavior has greater explanatory power than the earlier Beaverian model.

BEAVER (1981b) It is interesting to note that in a paper that was published in the same year as his book (1981a), Beaver proposed a model of market behavior that appears to have much greater explanatory power of the real market situation and which moves away considerably from the efficient market position earlier held (the book was probably written somewhat earlier). The first part of this article is a review of the theoretical basis of EMH first proposed by Fama in 1970 taking note of the subsequent research since then. Beaver pointed out the ambiguities and the difficulties associated



with this model as has been discussed in some detail in Chapter One of this thesis. He therefore proposed a new model of EMH to overcome these difficulties. Beaver's paper postulates that the informational efficiency of a security market should be regarded as of a "two-stage" process. In this schema, these two stages are referred to as "Signal Efficiency" and "Informational System Efficiency". Signal efficiency refers to the correct equilibrium pricing of a security in respect of a particular signal from an information system. One cannot generalise on the overall informational system efficiency of a market from tests relating to a particular signal or class of signals. Thus one cannot cite the case of the efficient market reaction to disclosure under ASR 190 (i.e. the rule for disclosing inflation adjusted earnings) as proof for overall market efficiency of the semi-strong form. Informational system efficiency refers to the efficient pricing of all securities in respect of every signal which may arise from a particular information system. Care must obviously be taken in trying to justify the latter since it implies a far higher level of efficiency.

In the last part of this article, Beaver appears to indicate that his support is for a position of market efficiency that is considerably weaker than pure efficiency. He gave support to the models which allow for this, for example, Grossman & Stiglitz's described earlier.

#### 4.3 - Research on Efficiency when Dealing with Earnings and Dividend Information

In this section, we shall be examining papers which attempt to demonstrate either that the market responds efficiently or inefficiently to the release of public information related to corporate earnings and dividends. Since this is an extremely complicated and intensely researched area, the publications concerned will be divided into various subsections for discussions. Section 4.3 will therefore be divided into the following parts:-

##### 4.3.1 - The Information Content of Earnings Announcement

###### 4.3.1.1 - Short Term Earnings



- (A) Predictability of Short Term Earnings
- (B) Market Reaction to Unexpected Earnings Announcements

#### 4.3.1.2 - Long Term Earnings

- (A) Predictability of Long Term Earnings
- (B) Relationship between Long Term Price and Earnings

#### 4.3.1.3 - Concluding Remarks on Section 4.3.1

### 4.3.2 - The Information Content of Dividend Announcements

#### 4.3.2.1 - Dividend Yield and Stock Return

#### 4.3.2.2 - Dividend Changes, its Predictability and its Place in the Pricing of Stocks

#### 4.3.2.3 - Concluding Remarks on Section 4.3.2

### 4.3.1 - THE INFORMATIONAL CONTENT OF EARNINGS ANNOUNCEMENTS

Since Williams (1938), it is generally accepted by students of the stockmarket that the value of a stock is dependent on the discounted stream of its future earnings (or dividend, which is derived from earnings in any case). If we were to accept that current and past earnings records convey a certain amount of information about the expected future earnings, the earnings figures which are periodically released must constitute an important piece of information processed by the market to place a valuation on stocks. As a result, the ability of the market to make use of current earnings announcements has been subjected to close scrutiny by many researchers.

The usefulness of current earnings announcements as tools for price forecasting would depend on its predictability as well as its past behavior relative to price. If the past earnings series are either totally predictable or unpredictable and/or their behavior has no connection at all with that of the price series, then the utility of this information would be zero. Only if there is a strong relationship between price and earnings and if the earnings figures

themselves are to a certain extent unpredictable (that is, the cost of search is non-zero), would the unanticipated earnings announcements attract any responses. Therefore much of the work in this area is related to these two questions.

This subsection will examine short term (i.e. less than 12 months) and long term earnings separately because the utility, predictability and the efficiency with which the market treats short term and long term earnings are quite different.

#### 4.3.1.1 - Short Term Earnings

##### (A) The Predictability of Short Term Earnings

The early work of Little(1962) and its later imitators gave the impression that future earnings were not predictable and that the value of earnings information is therefore zero. However, later research was to show there was considerable departure from this picture when the shorter term is considered. When dealing with the short term situation, such a conclusion would seem to be overstated or perhaps even in error. Several important papers were later published which demonstrated that the short term changes in earnings of firms were not that random, and that some analysts were able to make more accurate earnings forecasts than by merely extrapolating from past data. (It is also demonstratable that deviations from expected earnings could lead to price reactions which deviate from pure randomness as will be shown in the next subsection). It would seem that the informational content of earnings announcements is greater than originally thought. Of the many studies carried out in this area, two will be briefly discussed next.

BROWN AND ROZEFF (1978) The authors set out to test that under the hypothesis of rational expectation, the long run survival of financial analysts must imply that their forecasts must be better than that of martingales or submartingales. They were of the opinion that past comparisons which yielded the conclusion that analysts could do no better than martingales were invalid because of sample selection bias. They used a forecasting horizon of five quarters and compared the results from four different methods of forecasting - seasonal martingale, seasonal submartingale, Box-Jenkins and Valueline Corporation forecasts. The research utilised 50 firms for 1972-1975. Their results seem to show that the Valueline forecast to

be overwhelmingly superior to the other three methods and the Box-Jenkins method to be superior to the other two time series models. This strongly suggests that Valueline Corporation used information other than earnings time series and was able to achieve superior forecasts.

In a similar vein, CHANT (1980) tested the accuracy of other forecast tools against time series models and found that it was possible to do better than pure random walk. He used six different stock price forecast variables - money supply, stock indices, bank loan, average growth, exponentially smoothed and random walk. His results showed that the money supply model was significantly better than random walk although surprisingly, none of the others was any better.

The second paper has shown that even very simple procedure could produce surprisingly good predictions of future earnings. Taken together with the first paper, it is quite clear that good analysts can and do produce reasonable earnings predictions. Given this conclusion and provided that there is strong correlation between earnings changes and price changes, it would be possible to predict stock prices as well. Several papers have been published which showed that the price of a stock is fairly closely correlated with the change of its earnings. Among them are BEAVER (1968), NIEDERHOFFER AND REGAN (1972) and BEAVER, CLARKE AND WRIGHT (1979), the last of which will be examined below in greater detail.

BEAVER, CLARKE AND WRIGHT (1979) (BCW) This was a most extensive piece of work which set out to show that, ".....a positive ordinal association exists between unsystematic returns and the magnitude of earnings forecast errors." BCW tested two different earnings forecast models and two different methods of measuring forecast errors. The two different earnings forecast models are: (A) Martingale with a Drift and (B) A model based on the postulate that the change in EPS is a linear function of the change in market index.

The four sets of tests were run using data on 276 firms for the ten years from 1965-1974. All four tests yielded very similar results. The unsystematic return was measured for the 12 months upto the point of earnings announcement (assumed to be three months after the end of the fiscal year). BCW was able to show very high correlation between high earnings forecast error and high unsystematic return the mean

Spearman Rank-Order Correlation Coefficient being 0.72 for Model (A) and 0.68 for Model (B). It would thus seem that the US market has very good foreknowledge of future earnings.

Given the validity of the above findings, if one can predict the earnings on a stock accurately and early enough, one should be able to make abnormal profit. (Niederhoffer and Regan made this point in their paper as well). However, in the US, earnings forecasts (from many sources) for the great majority of the listed stocks are available "off the shelf". Thus the price of a stock at any one time may already incorporate the market's expectation of its future earnings. There may therefore be little point trying to make use of earnings forecasts for predicting future price level unless such forecasts are only available monopolistically.

In general, researchers do indeed accept that this could well be the case. Another way to examine how the market would respond to announced earnings figures would have to be found. If the price of a stock already incorporates the market's expectation of its future earnings, would not its price show some reactions if the actual earnings turns out to be much lower or higher than expected. This is the direction of much of the research which attempted to study the market's reaction to new earnings information. Two of the more important papers will be discussed next.

#### (B) Market Reaction to Unexpected Earnings Announcements

The work of Ball and Brown (1968) has been discussed in some detail in Chapter Three together with its defects. During the Seventies, several well known pieces of work were carried out to correct these defects. (The earlier mentioned work of Niederhoffer & Regan ought to be considered as of the same class of work as those described here).

BROWN AND KENNELLY (1972) They used both quarterly earnings figures as well as the annual earnings figures as the basis of comparing the actual performance of the sampled companies with that of the expected based on GNP (i.e. using Ball and Brown's method for making earnings forecasts). They found that using methodology that was similar to that of Ball & Brown, they could obtain API's that were 30-40% higher with quarterly earnings figures compared with annual earnings figures. Apart from this, they also found that the API of the companies which had suffered forecast errors started

moving up from about 11 months before the announcement date and continued to do so up till the end of the recorded period ( 6 months after the announcement date). Although the slow speed of adjustment after the announcement of earnings is clear evidence of inefficiency, they did not draw any conclusion regarding the efficiency or inefficiency of the market.

JOY, LITZENBERGER AND McENALLY (1977) (JLM) They made further improvements to the methodology of Ball & Brown. Firstly, weekly prices were used instead of monthly prices in order to obtain a finer picture of the market's reaction. Secondly, the market's response to forecast errors between the actual and expected earnings was divided into three categories - 0-20%, 20-40% and above 40%. The reason for doing so is that they felt that small forecast errors may be ignored by the market. Their results seem to indicate that they were right in thinking so. At 26 weeks after the announcement of earnings, those firms with positive earnings forecast error of greater than 20% had an API which was 15% greater than firms which have incurred a negative forecast error of similar magnitude. The API of firms with greater than 40% forecast error showed similar abnormality. As the authors pointed out, even after incorporating transaction costs, such difference in API would still result in a handsome profit. Again, the API was found to have started moving up well before the announcement date.

Based on the two above papers, we can come to some important conclusions about market behavior in the US in respect of earnings announcements:-

- (1) The market seems to have a prior expectation of what the forthcoming earnings figure for each listed firm ought to be:
- (2) In addition to having a prior expectation of what a firm's earnings ought to be, the market seems to "know" in advance if the firm is going to experience an increase or decrease in earnings and the price of a stock would have moved considerably in the direction of the eventual earnings change well before the announcement ;
- (3) A good facsimile of the market's earnings expectations can be developed from fairly simple method/s;
- (4) If the actual figure differs considerably from what had been

expected, there is a further price reaction in the direction of the forecast error in addition to the previous movement; and

(5) The reaction is not instantaneous, taking up to 26 weeks to take full effect.

Using the schema developed in Section 1.4.3, the implication is that the US market, in so far as earnings forecast error is concerned, attains Stage II efficiency but not Stage III. There is therefore a potential for making abnormal profit. In addition, it is possible that there may exist earnings forecast methods which are more accurate than those used hitherto which could more accurately predict future earnings and hence prices with even greater potential for making abnormal gains. So far, there is no well known paper on any direct test on the possibility of obtaining abnormal gains by accurate earnings forecasts.

The findings of JLM would seem, at first glance, to conflict with the first of the two major findings of the next paper. However, closer examination would reveal that such conflict is more apparent than real. A reconciliation between the two would be offered after the discussion of the next paper.

BEAVER, LAMBERT AND MORSE (1980) (BLM) BLM turned the traditional relationship inferred between price and earnings upside down by looking at the relationship in the opposite direction. Their study covered 19 years of records on the Compustat tape with a sample size of between 363 to 748 firms. The contemporaneous relationship between the two with the price as the dependent variable was first examined. Their result showed that the average regression coefficient was 0.12 and the mean coefficient of determination was only 0.07. The mean regression coefficient of 0.12 seems to imply that earnings series is not a random walk in which case it would have been (or close to) 0. The coefficient of determination was so low that it would warrant the conclusion that it was most unlikely that the observed changes in prices be the result of earnings changes.

However, when the regression was performed in the other direction using the current year's price changes and the following year's earnings changes, the coefficient of determination was considerably higher at 0.26. This implies that to an extent, it is possible to anticipate future earnings change from observation of price behavior.



Further simple tests conducted by BLM seemed to indicate that price based forecasting models were more accurate than models based on random walk with a drift.

This led BLM to propose that the process for the generation of earnings of a firm was a compound process. The earnings were generated by a mixture of two elements. The first element was generated by events which were related to stock price and which appeared to exhibit a lagged response to the information contained in the price. The second element was generated by those events which were independent of the stock price.

The second important implication of BLM's work is its explanation for the "peculiar" long term behavior of price earnings ratios (which will be examined in the next subsection) for "mean reversion". The explanation being that current earnings (which is used for the computation of PER) contains both a transitory as well as a permanent component. Only the permanent component of earnings ought to be reflected in the price since over the long term, the transitory component would be self-cancelling. This being the case, when the transitory component is large and positive, the PER would be low and vice versa. Given that the transitory component is self cancelling, it is not surprising that PER has a strong tendency to "mean reversion".

Reconciliation between Joy, Litzenberger and McEnally and Beaver, Lambert and Morse It is quite simple to explain the first finding of BLM. BLM used annual earnings figures in an aggregative study hence it committed all the faults of Ball and Brown. It is not at all surprising that the coefficient of determination on a regression using price against earnings is so low.

It is also possible to offer an explanation for the second finding in a way which does not overturn the validity of JLM's finding. In a way, this finding of BLM is not at all surprising since the stockmarket is well known as a leading indicator of the economy. As Cohen, Zinbarg and Zeikel (1973) showed in their book, the stockmarket price cycle apparently led the economic cycle by between 3-9 months over the post war period. The US Department of Labour (USDL) uses stockmarket returns as one of the components of its leading indicator index. Since national income is the most powerful determinant of corporate earnings, it is not surprising that

price leads earnings.

There is no denying that on an aggregative basis, the market is highly efficient in that it can look some way into the future. However, such evidence of prescience has to be tempered by two considerations. Firstly, the announced as opposed to actual annual corporate earnings figures lag the national income by a considerable margin. The annual earnings figures are only released about 7-8 months after half the annual income has been earned. Secondly, in addition to the month by month release of national income figures by the USDL, there are a large number of public and private forecasts of next year's GNP. The market, as a complete entity, therefore has a very good idea of following year's aggregate corporate earnings.

The market is also capable of discerning the future of the individual stocks. This statement is supported by evidence from JLM's work as well. This does not mean that the market can be said to be fully efficient with regard to all earnings signals. While it could look into the future and adjust stock prices according to its expectation, this adjustment does not appear to be fully completed at the time of the announcement or even shortly after. This then is the most important implication of JLM's work; that is, the market does not work instantaneously in accordance with the EMH model.

BLM's postulation that earnings is generated by a two component process is fully compatible with JLM's finding. It is possible that the delayed response of the market to earnings forecast errors revealed in JLM's work was more due to the effect of the second component (i.e. the idiosyncratic element of earnings formation). BLM's finding was more the probable result of the first component (the one which was thought to show a lagged response to price). However, it would seem more logical to say that the earnings are not generated by the price but by a factor which appears to have a contemporaneous response in price and a lagged response in earnings. As was pointed out earlier, this factor is probably the national income. Using Beaver's own schema, there is little doubt that the market is highly efficient in terms of the signal on overall corporate earnings but it is less efficient when it is dealing with signals on individual corporate earnings.

#### 4.3.1.2 - Long Term Earnings

### (A) Predictability of Long Term Earnings

Important work dealing with this topic will be discussed in detail in Chapter Five and they will hence be dealt with briefly here. The best known work dealing with the predictability of earnings is arguably that by LITTLE (1962). The other early works of note are papers by LITTLE AND RAYNER (1966), LINTNER AND GLAUBER (1967) and BALL AND WATTS (1972). The general conclusion which one can draw from these papers is that the annual earnings series appear to follow something that is either close to a random walk or random walk with a drift. If the long run earnings series of firms are true random walks, this would imply that it would take a very superior analyst indeed to be able to produce accurate forecasts. Much of the time, earnings forecasts would therefore be useless. Following this line of reasoning, it would be logical to conclude that if the market is rational, it would not bother to do any research on earnings forecasting and if any research is carried out, it would most probably ignore them. These early papers therefore seem to support the main tenets of the EMH.

The picture of the long term relationship between earnings and price as revealed by published work is somewhat confused. There have been many papers studying the relationship between earnings and price over the long term, many of them focusing on the usefulness of price earnings ratio as a predictive tool for long term earnings growth. Most of these papers fall into two categories - one examining the usefulness of PER as a predictor of future earnings growth and the second examining the possibility of abnormal gain by using low PER as a selection strategy. As will be shown in Section 4.4.2, the second category of papers has turned out to be victims of model misspecification. Owing to the tendency of researchers to use massive sample without stratification, the test for low PER effect turned out to be largely a test for the small firm effect. As a result, their conclusion regarding the inefficiency with regard to low PER has been invalidated. Further research work in this area with stratified samples is probably required before any conclusion can be made in terms of this aspect of market inefficiency.

Initial studies of the first category led to the conclusion that the market was not capable of predicting future earnings growth because the PER of stocks at any one time had little correlation with subsequent earnings growth. The works of MURPHY AND STEVENSON

(1967) and CRAGG AND MALKIEL (1968) are often cited in support of this. However, such studies contained one basic defect - they failed to take into account the fact that the market could differentiate between the transitory and permanent elements of earnings growth as pointed out by BLM. The two elements together would tend to give a garbled picture of the predictive power of PER. The very comprehensive work by Beaver and Morse to be described next shows very clearly that upto two years, PER has very good predictive power. However, the picture for periods longer than two years is still unclear.

BEAVER AND MORSE (1978) This study made use of the data contained on the Compustat tape for a period of 19 years from 1956 to 1974 with the number of stocks in the sample increasing from 270 to 600. The stocks in each year's sample were first ranked into 25 portfolios by PER and the behavior of the PER of each portfolio subsequent to its formation was studied. The study made several important discoveries which are summarised below:-

(a) The rank correlation of portfolios over time subsequent to their formation was very good. The median correlation declined slowly over time - from 0.96 in the first year after formation to 0.44 after 14 years. Beaver and Morse interpreted this as indication of very long term persistence of the PER characteristic.

(b) The tendency for portfolio PER to converge was very strong in the first three years. The PER of the highest ranked portfolio was 8.6 times higher than the 25th portfolio in the year of formation, in the second year, the ratio had shrunk to 3.3 and by the third year it was only 2.1. But subsequent to the third year, the ratio was very persistent, shrinking only from 1.8 times to 1.2 in the 12th year. Beaver and Morse took this to mean that while certain factor(s) determining the PER at the time of portfolio formation had dissipated greatly after the third year, certain other factor(s) which explained PER persisted for a very long time.

(c) The rank correlation between PER and EPS growth in years subsequent to portfolio formation demonstrated a pattern which supported the contention that the market was adept at picking out the transitory component of the earnings. This was first reported by WHITBECK AND KISOR as early as 1963. The median correlation between the two was -0.28 in the first year, 0.53 in the second and

0.25 in the third year. The reason why the correlation was negative in the first year was that the market could see through the transitory part of the earnings and ignored it in its pricing of the stocks by rewarding stocks with temporary low EPS with a higher PER and vice versa. The good correlation in the first three years after formation clearly demonstrated the market's ability to predict earnings beyond one year. The tapering off of the correlation coefficient after the third year indicated the lack of ability or interest of the market in looking at the long term. However, the long term persistence of the correlation coefficient is very puzzling in view of the earlier finding regarding the random nature of earnings series.

(d) The persistence of the portfolio PER could only be partially explained by the riskiness of the stocks. This was difficult to demonstrate because the relationship between the two can either be positive or negative depending on whether the market was up or down in the period. However, the computation of the average beta of each portfolio grouped into "up" and "down" years demonstrated little difference between the highest and lowest ranking PER portfolios. However, with the addition of earnings growth rate, the two together had much better predictive power on PER; the coefficient of determination being 0.51.

Based on these findings, the authors concluded that none of the traditional factors appeared to offer strong explanatory power of the long term persistence of PER. They therefore offered accounting method as an explanation. However, they left this hypothesis untested.

#### 4.3.1.3 - CONCLUDING REMARKS FOR SECTION 4.3.1

Based on the foregoing discussions, it is possible to make the following statements about how efficiently the Western markets deal with information on earnings which has been well tested and the academics are in general agreement over the findings:-

(1) The earnings streams of companies appear to be made up of two components -- a short term one and a long term one. The market appears to be well aware of this.

(2) The market appears to have a good foreknowledge of the future earnings of companies. Such foreknowledge leads to the movements of



price of stocks in the direction of the expected earnings change prior to earnings announcements.

(3) There is in addition further price movements after the earnings announcement. Such movements appear to take some time to complete.

(4) The US market can therefore be said to have reached Stage II efficiency; being inefficient only to the extent that the reactions are slow to complete.

#### 4.3.2 - THE INFORMATIONAL CONTENT OF DIVIDENDS

Dividend is another area of finance which has been and still is being intensely researched. However, a very large percentage of the work is put into trying to prove or disprove the validity of Miller and Modigliani's assertion that "dividend does not matter". The relationship between this hypothesis and this dissertation is only peripheral and as a result, we shall only be examining this topic superficially in Chapter Five. In this dissertation, we are much more interested in how the market deals with various types of dividend information in its pricing of stocks. There are many types of dividend information and this dissertation will concentrate on two only -- Dividend Yield and Dividend Change information.

##### 4.3.2.1 - Dividend Yield and Stock Return

The return an investor can expect from an investment in stocks is usually in two parts -- dividend and capital appreciation. Typically, dividend forms a much smaller part of the total return than capital appreciation. Theoretically, all investors should ignore the split between dividend and capital gain and concentrate on the total expected return. However, the thinking of the practitioners and many fundamentalist writers (to be discussed in Chapter Five) is in contradiction to this principle. They consistently uphold the view that investors should concentrate on high yielding stocks, other things being equal.

It would seem that it is possible to test this assertion. However, the relationship between dividend yield and return is not an easy matter to test. Dividend yield is computed from two highly dynamic factors -- stock price and dividend rate. As with earnings, there



are probably two components in the dividend series as well. Given the sophistication of the Western market, when an investor is considering the dividend yield level at which to buy a stock, he would compute the yield based on some "normalised dividend rate" (In fact, a broker firm which the writer is familiar with uses precisely this concept). To use the published dividend yield figures directly is likely to lead to the sort of pitfalls described by Brealey (1971) when discussing the work of Robinson.

Robinson studied the relationship between dividend payout ratios and PER for the years 1945-1949. His result seemed to show that in each of these years, there was a strong relationship between dividend payout and PER. The result therefore appeared to lend strong support to the fundamentalists. But, as Brealey pointed out, Robinson's study included several unintentional biases. One possible bias was introduced by firms which had suffered temporary misfortunes (e.g. strike) which led to sharp earnings decline. As the management realised that such earnings decline was only temporary, the same dividend would be maintained. The market also realised this and as a result the price would not fall much. These events would lead to a high PER and high payout ratio. Another possible bias could be introduced by non-consideration of factors which had an effect on both the firm's dividend policy and market valuation. Thus, a firm with high leverage would be given a low PER by the market. At the same time, for reasons of safety, the company would adopt a low payout policy. Again the combination of events lead to a positive relationship between PER and payout.

Brealey went on to discuss in some detail the problems with other approaches for drawing a valid relationship between dividend yield and return. He found none of the tests he examined (among them : Arditti (1967) and Donaldson (1961) ) truly satisfactory for drawing an overall conclusion. However, he did state that there is considerable evidence for the assertion that investors were aware of the tax effect and that the hypothesis for the existence of a "cliente effect" was probably valid. If the cliente effect exists then there can be no logical reason to believe that there is a correlation between dividend yield and return. The next paper to be discussed used a novel method and its findings seems to support this assertion.

BLACK AND SCHOLES (1974) The authors reasoned that the more

traditional method of using cross sectional tests was less reliable because of the difficulty of controlling factors other than dividend yield. They therefore used an adaptation of the two parameter CAPM based on the supposition that increasing the dividend of a firm will decrease its future return. The relationship postulated is given by the following equation:-

$$E(\hat{R}_i) = \gamma_0 + \beta[E(\hat{R}_m) - \gamma_0] + \gamma_1(\delta_i - \delta_m)/\delta_m$$

Where:  $\hat{R}_i$  = Expected return on security i  
 $\hat{R}_m$  = Expected return on the market  
 $\delta_i$  = Dividend yield on security i  
 $\delta_m$  = Dividend yield on the market

The cross sectional regressions were carried out with the stocks divided into 25 intermediate portfolios according to their betas. The regressions were performed on the monthly data on dividend yield, price and return for every common stock listed on the NYSE from 1926 to 1966.

The results of the study appeared to confirm the well accepted view that the return of a stock depended on its beta. The regressions also showed that the coefficient for dividend yield was close to zero. This seemed to imply that the market is efficient to the degree that it recognises that dividend per se is of no importance. However, the next test, using very similar methodology, came to the opposite conclusion regarding the importance of dividend yield.

BLUME (1980) He applied Black and Scholes' method to a slightly different regression model :-

$$r_{it} = a_t + b_t \beta_{it} + c_t \delta_{it} + \epsilon_{it}$$

Where :  $r_{it}$  = Return on the ith security for the tth period  
 $\beta_{it}$  = Beta of the ith security in the tth period  
 $\delta_{it}$  = Dividend yield on the ith security for the tth period

The one major difference was that Blume used a different definition for "Dividend Yield". He defined Dividend Yield on an "anticipated" basis rather than on an "as is" basis. The former being defined as the

dividend paid in the previous twelve months divided by the price at the BEGINNING of the twelve months adjusted for the overall market movement for the twelve months. The latter being defined as the same amount of dividend divided by the end of period price (this would be the normal definition of dividend yield).

Blume carried out quarterly regressions from the data taken from the Compustat tapes for the period January 1936 to December 1976, divided into five subperiods. His result showed positive correlation between dividend yield (as defined) and return throughout the whole period, although only two of the five sets of correlations for each of the subperiods were significant.

**Concluding Remarks on Dividend Yield Effect** At this stage it is not possible to offer more than a very tentative explanation on why Blume's test should produce such a diametrically opposite result to Black and Scholes'. The explanation possibly lies in the former's definition of dividend yield. Given the foreknowledge of earnings the market has, it is likely that dividend yield as computed by Black and Scholes would have discounted the expected future change in dividend and the stock price would have adjusted accordingly. Dividend yield computed at that point would therefore bear little relationship with the future return on the stock.

If Blume's conclusion is correct and there is indeed a linear relationship between dividend yield and return, it should not automatically lead one to conclude that the US market is inefficient. In view of the otherwise highly efficient nature of the market, there may be other explanations for this anomaly. A possible explanation could be that the investors do adhere to "a bird in hand is preferable to two in the bush" principle. That is, they put a higher premium on dividend return as against capital appreciation. This being so, the traditional model would fall foul of model misspecification since the riskiness of the two types of return would not be the same in the eyes of the investors. The existence of a linear relationship between dividend yield and return could just as well be regarded as a sign of efficiency as inefficiency since the investors take dividend yield information into account for pricing of stocks.

While it is not possible to state categorically whether dividend yield information is efficiently utilised, it is important to note

that one way or another, dividend yield information appears to influence investment decision making and in that sense, the market is at least Stage I efficient. It would be interesting to replicate Blume's test on another, less sophisticated, market to uncover if any difference exists.

#### 4.3.2.2 - DIVIDEND CHANGES, THEIR PREDICTABILITY AND THEIR PLACE IN THE DETERMINATION OF STOCK PRICES

It is arguable that dividend yield information is among the most readily available of investment information. It is perhaps not surprising that a sophisticated market like the US treats this piece of information efficiently. Dividend change information requires greater sophistication on the part of the investor to correctly interpret the significance of the information. Firstly, the investors would need to have a record of the previous payments or have some idea of the dividend trend from which they have developed a prior expectation of what the dividend ought to be. Secondly, they would need to be able to compare what the dividend "ought to be" and what it is and re-evaluate the stock in the light of this difference. The next two papers to be examined investigated the ability of the market to efficiently interpret dividend change announcements. The prima facie evidence seems to indicate that the market is efficient in terms of this particular type of information.

PETTIT (1972) Pettit used the API method to study the monthly price performance of 625 NYSE stocks which had undergone dividend changes during the period 1964-1968. He also carried out a parallel study using daily prices for the period 1967-1969. The API for seven different dividend change categories were separately computed - Omission, Reduction, No Change, Increase of 10% or less, Increase of 10-25% and Increase Exceeding 25%.

His study showed that the API of stocks of all categories became fully adjusted either by the end of the announcement month (for the monthly prices) or within a few days (for the daily prices). It is important to note that the amount of adjustment undergone by the API correlated very well with the amount of dividend change.

WATTS (1973) He examined the informational content of dividend changes from a different angle. He reasoned that the management of firms had a much better idea of the future earnings prospects of the

firm than the market. Since traditionally the management of firms are thought to hold the view that the quantum of dividend payment is sacrosanct in the downward direction, they would therefore only change the dividend rate if they were very sure of the future earnings prospect of the firms. If this were the case, there would be positive correlation between dividend changes and future earnings. If this relationship existed, a knowledgeable investor would be able to make abnormal gain if the market as a whole was not aware of this relationship. Watts used the API method to examine the data on 310 firms for the period 1945-1968 and he concluded thus :-

(a) Although there is a positive correlation between dividend changes and future earnings changes, the correlation is so small that it would have little informational value; and

(b) The API of firms which were expected to have earnings changes due to dividend changes tended to stay close to 1.00 for the twelve months before and after the abnormal dividend changes. Thus it would seem impossible to make abnormal gain from this piece of information.

While the above two papers seem to show conclusively that the market appears to attain Stage III efficiency in terms of dividend announcements, there are two points to consider. Firstly, it could be argued that although the dividend change information has been incorporated in the price at the time of dividend announcement, this does not necessarily imply prescience on the part of the market. It could mean that the dividend information could be a function of a third as yet unknown variable which itself has an effect on price.

Secondly, it could also be argued that such lack of reaction to dividend changes could be due to the lack of significance accorded to dividend information by the market and as a result it is not used in the process of price formation to any large extent. It could be argued that the quantum of dividend paid out by each firm is an artificial quantity affected by the inclination, economic reality, tradition and a host of other factors. This being so, the real significance of dividend changes is very much garbled by external noise; to the extent that its informational value may be close to zero. The next paper to be discussed leads support to this view.

FAMA AND BABIAK (1968) The authors set out to test Lintner's "partial adjustment model" for dividend payments. According to this



model, each firm usually has a long run target dividend payout ratio. However, it would not be possible under normal circumstances to stick to this rate rigidly because of the usual variability in earnings. The firm therefore makes an effort to adjust the dividend to this rate only partially in response to a change in earnings. Unless and until the new earnings trend is confirmed by several years of earnings at the new level, a firm would not move back completely to the long run payout rate.

They utilised multiple regression of the current dividend against prior years' earnings and were able to show positive correlation. This implies that current dividend rate is very much a product of previous years' earnings for which the market has full knowledge. It is therefore not surprising that neither Pettit nor Watts were able to show much informational value for dividend announcements.

The foregoing paragraph of course does not imply that dividend announcements always have zero informational value. The next two papers were to show that under certain circumstances, dividend announcements have value and the market does react to them.

AHARONY AND SWARY (1980) This study is less concerned with the question of EMH but more with the question of whether "dividend does not matter". However, its finding is of interest in connection with the current discussion of whether the market deals efficiently with dividend information. The authors reasoned that it had been difficult to isolate the "pure" effect of dividend announcements because its effect cannot be separated from the effect of the usually concurrent earnings announcement. They therefore examined the effect of dividend announcements made either before or after the earnings announcements.

They used the CAR method pioneered by FFJR to isolate the abnormal return associated with such announcements. They were able to show considerable movements in the CAR in the same direction as the changes of dividend announced (except in the case of no dividend change where the effect was positive) after the date of the announcements. This finding seems to uphold the the finding of JLM and the contention that the market does react to "unusual" dividend announcements, albeit more slowly than EMH model would suggest.

ASQUITH AND MULLINS (1983) The authors of this paper used another method of studying the effect of "unusual" dividend announcements.



They studied the market reaction to firms which initiated or resumed (after a long break) dividend payments. Again they used FFJR's CAR method. The sample consisted of 168 such announcements. They found that the CAR showed excess return of upto 4.3% after such announcements.

#### 4.3.2.3 - CONCLUDING REMARKS ON SECTION 4.3.2

It is possible to come to some conclusions after this long and complex survey of the research work in the area of informational value of dividend:-

(1) the situation surrounding the dividend yield information is complex and cannot be readily summarised. It is perhaps more important to note that this type of information is very well used by the market than how efficiently it is being utilised.

(2) While there is strong evidence that dividend change information appears to be very efficiently utilised by the US market, there is also strong evidence that the quantum of dividend in itself is an artificial quantity. Apart from abnormal situations such as drastic dividend cuts and resumptions of dividend payment, dividend information does not appear to be a very important piece of information.

(3) Given that dividend data in itself is not very important, a different approach will be considered when testing the Malaysian market for informational efficiency surrounding dividend data.

#### 4.4 - OTHER ASPECTS OF SEMI-STRONG FORM INFORMATIONAL EFFICIENCY

In this section, we shall be examining further the informational efficiency of the market with regard to other types of semi-strong information. Here we shall be beginning to examine the margin of the market's efficiency by looking at information which appears to be inefficiently treated by the market while previously we were considering information which was either very efficiently or reasonably efficiently treated by the market.

#### 4.4.1 - THE SPEED OF ADJUSTMENT TO NEW INFORMATION

In efficiency debate, the condition of speedy adjustment to new information is usually assumed as given. For unless the speed of adjustment is rapid, it would present opportunity to traders who are closer to the market place (both physically and informationwise) to act first and reap abnormal profit. In the previous section we have seen that there are indications of less than rapid adjustment of the market in the cases of earnings forecast errors and unexpected dividend changes. Here we shall look at several more instances of less than rapid adjustment of the market to new information.

In the earlier years of efficient market research, it was typically assumed that the market reacts speedily to new information. The studies there were cited in support of this are those by BEAVER (1968) AND FOSTER (1976). In both papers, the conclusion reached regarding the speed of adjustment of the market to new earnings information was similar. Both authors concluded that the market was efficient because the prices appeared to fully reflect the information content of the new earnings announcements within one or two days (Forster's paper) or weeks (Beaver's paper). However, both studies contain the same defect as the studies on earnings forecast errors examined earlier in this chapter. That is, the effect of the information studied is that of the aggregative information. If modifications to the methodology is introduced to consider only the more severe cases of earnings increase or decrease, a very mixed picture emerges as can be seen from the next paper.

BROWN (1978) He reasoned that the market's reaction as studied by the two previous authors was the average reaction which masked the reaction of the more extreme cases of earnings changes. He therefore only took into account the extreme cases by examining the price reactions of companies which have experienced an earnings changes of greater than 20% either in the positive or negative direction. Using three different abnormal performance indices, API; CAR; and PPI (the last developed by Pettit), Brown was able to show that the market's reaction was very slow (confirmed by all three indices). The market took as long as 60 days to fully adjust to the new earnings announcements. The difference in prices between firms that had suffered an earnings decline as compared with firms which had experienced an earnings increase was in the order of 16-17%. The author therefore concluded thus : " Examination of Figure 1 (i.e.

figure of the CAR for 0-60 days for firms with PFE and NFE) reveals that the adjustment of stock prices to EPS information apparently takes some time. The CAR trends strongly until about day 45 after the earnings announcement in the Wall Street Journal."

KAPLAN AND ROLL (1973) Confirmation of the slow reaction of the market can be obtained from a most unexpected source. The purpose of this study was to examine the ability of the market to see through the accounting earnings presented by the firm which had been enhanced by "creative accounting" as against firms whose earnings increase was "real". The authors examined firms that had adopted two accounting sleights-of-hand to improve their earnings figures ( the use of immediate flow-through of investment tax credit and the use of depreciation switchback). According to their definition of efficiency, the market ought to be able to see through such techniques and the earnings figures would be discounted by the market as if there had been no increase in earnings. The prima facie evidence seems to indicate that the market indeed was efficient with regard to this particular information. However, what is surprising is the length of time required for the price to adjust fully relative to the control groups. In both types of accounting changes, the market took as long as 60 weeks to adjust fully. While the amount of adjustment is not very much ( in the order of 8% in both cases), the slowness of the reaction appears to confirm the earlier contention that the market is not efficient in this respect.

The above papers have demonstrated that one of the prime assumptions behind market efficiency does not appear to hold true in all instances. Parenthetically, it may be useful to note another paper which calls to question two other major assumptions behind the EMH - zero transaction cost and perfectly rational investors. A well researched anomaly of the stockmarket is the "seasoning" required for old bonds to adjust to the yield of new bonds. An example of these would be the paper by LINDVALL (1977). From the EMH's point of view, it just does not make sense that the old and new bonds of the same risk class should be selling at different yield levels. Admittedly, the differences in yield are not great but their existence is still troubling nevertheless. Lindvall offered several explanations for the low level of trading in old bonds which resulted in their slow seasoning. All these explanations could be linked to the fact that in the US, bonds are largely held by institutions or trust departments of institutions. Firstly, the nature of the liquidity

requirement of institutions had meant that the bonds were traded more to meet the funds requirements rather than to maximise the yield obtainable. Secondly, the explicit and implicit cost of trading argued against trading. Thirdly, there was a "lock-in" effect as the old bonds were carried on the balance sheets of the institutions at much higher price than the current market value (this study was conducted during a time of fast rising interest rate). Even if from the cashflow point of view it was advantageous to trade, the desire not to suffer too much accounting loss would argue against it. Given this institutional bias against trading and thinness of trading in this sector otherwise, the old bonds would therefore only adjust slowly to the new bonds' yield.

This evidence of the inability of the institutions to act rationally is supported by the oft remarked "incompetence" of institutions by fundamentalist writers such as DREMAN in (1977) and "ADAM SMITH" (1964 and 1968). This lack of economic rationality and the possibility of thinness of trading in certain sectors of the market is very disturbing in view of the basic assumptions of EMH supporters.

#### 4.4.2 - SMALL FIRM AND OTHER "THIN TRADING" EFFECTS

##### (A) The Small Firm Effect

The "small firm effect" alludes to the wellknown fact that investment in the stocks of smaller firms could provide much higher return than investment in larger firms even after the appropriate adjustment for risk has been made. This effect was initially thought to be the "low PER effect" since it was first noticed that investment in low PER stocks could generate much higher returns than investment in high PER stocks, a manifestly inefficient state of the market. This was demonstrated by BASU (1977) among others.

Later BANZ (1981) and REINGANUM (1981a) were able to show convincingly that the low PER effect was in fact a surrogate of the small firm effect because smaller firms have much lower PER than larger firms. This anomaly is obviously extremely disturbing to proponents of EMH since it does not seem possible that such a simple mechanical trading rule could yield higher returns. Since its initial discovery, EMH proponents had been trying to uncover possibilities of

risk misspecification to account for the much higher return. As an example of this, ROLL (1981) postulated that the low trading that was prevalent among smaller firms' stocks could result in their computed betas being considerably lower than they actually were. In 1982, REINGANUM demonstrated that after using the adjustment for low trading proposed by DIMSON (1979), the stocks of small firms still yielded much higher return.

These publications started a big chain of research on the subject. As an example of the intensity of the current research, in Volume 12 (1983) of the Journal of Financial Economics, there are seven papers on this one topic. As indicated by the tone of the paper by Reinganum (1981a), proponents of EMH were convinced that there may be some as yet undiscovered risk factors which could explain the higher return. Most of the papers in the 1983 issue of Journal of Financial Economics are of this genre. It is worthwhile quoting in full the conclusion of SCHWERT (1983) which is the introductory and in a sense, the concluding paper for the other six.

"The search for an explanation of this anomaly (size effect) has been unsuccessful. Almost all authors of papers on the 'size effect' agree that it is evidence of misspecification of the capital asset pricing model, rather than evidence of inefficient capital markets. On the other hand, none of the attempts to modify the CAPM to account for taxation, transaction costs, skewness of preference and so forth has been successful at discovering the 'missing factor' for which size is a proxy."

As stated by BROWN, KLEIDON AND MARSH (1983), the idea of misspecification of CAPM is a "catchall" which can provide an explanation for any anomaly. However, as additional evidence appears (as in JAMES AND EDMINSTER (1983)); other, more neutral observers are of the view that this could well be a clear case of inefficiency.

This writer concurs with the latter view and would like to add that this case of inefficiency seems to be a fairly clear indication that the cost of information search to the investors is probably far from similar for the large and small firms. This and the thinness of the market owing to lack of participation by both the institutional investors (the small number of shares available, the relatively high cost of information and possibly an inbuilt bias against small firms)



and the individual investors (lack of knowledge) lead to the knowledgeable investors being able to reap abnormal gain from their investment.

This view of the writer is given some support by the recent paper of BARRY AND BROWN (1984). Barry and Brown tested for relationship between available information (using period of listing as a proxy) and return and concluded:-

We show that period of listing, a crude measure of differential information is associated with the well known 'size effect' anomaly. However, this information argument does by no means fully explain the firm size anomaly, and it is an open question as to whether a more satisfactory measure of information would more completely explain the observed size effect. It is interesting to note that at least one popular explanation of the small firm effect, an explanation in terms of a turn-of-the-year phenomenon, does not in anyway diminish the period of listing effect seen in the data."

As has been pointed out in Section 4.2 and the previous paragraph, the presence of a large number of participants in a particular sector is an important prerequisite for efficiency. Such lack of participation, as in the case of the small firms, can lead to inefficiencies. The following two papers offer additional evidence of such inefficiency.

#### (B) The Effect of Thin Trading

This writer coined this "effect" in order to group together the evidence of inefficiency related to less popularly traded securities. The earlier quoted paper by Lindvall (1977) shows that even in fairly straight-forward cases, there can be evidence of inefficiency when the trading volume is low. Several papers have demonstrated that similar type of inefficiency exists in other sectors of the market, two of which will be examined here. In addition, a collection of papers which demonstrates efficiency with respect to one particular class of information which was of wide public concern will be examined as a case of, "the exception which proves the rule". While there could perhaps be other reason(s) for the inefficiency of this type, to this writer at least, available evidence seems to indicate that the stated



reason may well be the more cogent one.

MARSH (1979) Marsh's paper is concerned with the efficiency demonstrated by stocks at the time of rights issues which are very common in Britain but much less common in the US. The stated purpose of the study was to examine the informational efficiency of the market with regards to rights issues and to test the two conflicting theories regarding the pricing of stocks at the time of new issues - Price Pressure Hypothesis versus Substitution Hypothesis. Briefly stated, the Price Pressure Hypothesis asserts that the demand curve for a firm's securities is downward sloping which implies that a rights issue would depress the price of a stock. The Substitution Hypothesis asserts that all stocks are perfect substitutes for one another because they are all efficiently priced in terms of each stock's expected return. Hence a rights issue should have no effect on price. Marsh was, in effect, attempting to test two aspects of the market. Firstly, he was interested to see if the market could absorb new issues without price drops. Secondly, he was interested in discovering any longer term abnormal behavior (cf the test by Fama et al.). His results were mixed in terms of efficiency.

The results of the first test seems to indicate a degree of efficiency. Irrespective of the size of the individual issues, there was only a small temporary drop in prices (in the region of 1%). This evidence indeed appears to uphold the contention that stocks are near perfect substitutes for one another. But tests of the second type appear to indicate considerable inefficiency. His results shows that the stocks of small firms issuing rights (as opposed to firms making small rights issues) appeared to enjoy abnormally good performance for the six months after the rights issues. This appears to be in blatant contradiction to EMH. It would therefore appear that the market can be schizophrenic. It could be very efficient with regard to one particular type of information (the value of rights vis a vis the other securities) and yet at the same time be inefficient in respect of another type of information (expected return of small firms following rights).

MALKIEL (1977) Malkiel was able to show similar type of inefficiency by examining the returns on closed end investment companies. It is a common belief among investment professionals that closed end investment companies (or trusts) in both the US and Great Britain usually sell at a considerable discount to their underlying

market value. Malkiel showed that in the US at least, this belief was well founded. He attempted to find a possible explanation for this anomaly but failed. He found that the discount could not be explained by the riskiness of these stocks (about the same or even lower), the management fee exacted (usually below 1% only) or excessive trading (shown to be untrue). He believed that the explanation lay with the fact that the stockbrokers were not keen to "push" these type of securities as their commission would be lower than in the case of selling open end mutual funds and of course the institutions themselves would have little interest in purchasing this type of securities.

It is perhaps important point out that in recent years, the discount on closed end investment companies has been shrinking (as pointed out in an article in the Business Week of 16th April 1984). It may be overly deterministic to attribute this increasing pricing efficiency to the influence of wide spread coverage by popular press of the work by Malkiel and other writers on this aspect of the market, but it is difficult to think of another possible explanation of this sudden reversion to efficiency after many years of inefficiency.

The great complexity of the process of information creation and utilisation in the process of securities price formation which is continuously alluded to throughout this chapter can be further demonstrated by examining another collection of papers dealing of inflation adjusted earnings information. In the same issue of Journal of Accounting and Economics (Volume 2 No. 2), there are three papers on this subject together with a review article by WATTS AND ZIMMERMAN. (The mere fact that there should be four articles on the same topic in the same issue of one single journal shows the intense interest of academics (if not the investing world as a whole) on the question of inflation adjusted earnings.) All three papers (by BEAVER, CHRISTIE AND GRIFFIN, CHEYARA AND BOATSMAN and RO) show that the accounting information which was first released to the public following the promulgation of the SEC ASR 190 Regulation appeared to have very little effect on stock prices. Watts and Zimmerman argued that this was a clear indication of market efficiency since the market behaved as if it had already incorporated this information in the price. Given the fact that inflation adjustment of earnings is not a simple piece of information to derive, the ability of the market to reflect this information prior to it being publicised seems to uphold the case of market efficiency.

However, taking into consideration the other papers examined in this chapter, it would perhaps be more logical to conclude that the market and the public was so preoccupied with with the severe inflationary situation that it was highly sensitive to information on the real earnings capability of the listed firms. Indeed, even prior to the publication of mandatory inflation adjusted earnings figures, some firms were already doing it voluntarily. In addition, most large stockbrokers were already making available to their clients their own estimates of the effect of inflation on earnings. In this sense therefore, the newly released information may already be well known to the public and hence did not result in any price reactions.

From the above four papers, it would seem that the investment professionals have a very important part to play in the process of achieving market efficiency. The simple model of efficiency as put forward by Verrecchia (1979) or Beaver (1981a) is inadequate when tested in the real life circumstances. The creation, dissemination and comprehension of information leading to the investment decision making process is not a simple or direct one. The simplistic division of information into three forms in accordance with Fama's model does not take into adequate consideration the nature of the information transferral process. The model of market/information system as proposed in Chapter One of this thesis would appear to have greater validity even in the US situation. In a country with far lower level of sophistication, it would seem that the assumptions of instantaneous dissemination of all public information would be even harder to uphold.

#### 4.5 - OTHER ASPECTS OF INFORMATIONAL EFFICIENCY

In this section, we shall be examining a mixture of papers on various aspects of market efficiency.

##### 4.5.1 - INEFFICIENCY RELATED TO INFLATION AND LONG TERM OUTLOOK

Earlier in this chapter, the point is made that limited participation in a market sector could theoretically lead to inefficient pricing and that participation is not limited to physical sectors alone. Most fundamentalist writers, and some academics as well ( for example

Baumol), have long believed that the market is very often inefficient because the participants tend to be governed by emotion and fads rather than economic rationality in their behavior. One manifestation of this irrationality is the market's preoccupation with the short term. One aspect of this preoccupation, in the form of the analysts' seeming general disinclination to predict earnings beyond one year, has been pointed out earlier. In this section, we shall examine two more aspects of this irrationality.

Many writers have remarked on the market's inability to correctly interpret the effect of inflation on stock value (including LINTNER (1975)). Theoretically, stocks, being a claim against real assets, should keep pace with the rate of inflation in terms of improvement in value. HAJIM (1982) showed in a non-academic article that stocks had traditionally performed very badly during time of inflation. However, once the inflationary pressures eased, the price of stocks would rise very steeply to catch up, as it were. Thus he quoted the evidence of stocks rising by 500% in the wake of the inflation brought on by World War I; stocks rose by similar magnitude after the inflation of World War II and the Korean War. He therefore predicted that there would be a huge rise in stock prices in the Eighties as a result of depressed prices during the Seventies. The very large increase in stockmarket prices in the years since 1981 appears to show that his contention has been right so far. While Hajim is not an academic and his article could not be taken as providing more than anecdotal evidence, the next paper is of a different mould.

MODIGLIANI AND COHN (1979) The authors attempted to provide an explanation for this irrational behavior. They postulated that the incorrect pricing of stocks was caused by two major errors of the investors. Firstly, they had always capitalised the future earnings stream at the nominal rate rather than the economically correct real rate (the short term return on money market instruments, during a period of high inflation, would look very attractive compared with the nominal dividend yield of stocks). For, during a period of inflation, one should not compare the cash return on money market instruments (which are not real assets) with the expected cash return on stocks. One should compare the real return on stocks with the real return on bonds. Secondly, investors had never made allowance for the diminution in the value of corporate liabilities. They went on to show that had the profit of all the S & P 500 stocks

been discounted on this erroneous basis, their computed value would be very close to the actual price. They concluded that owing to this irrationality, the stocks on the NYSE were undervalued by about 50%. This conclusion is very similar to that of Hajim's.

One can only conjecture as to why the market should behave in this manner in the absence of any general agreement among the researchers and writers. Many supporters of the EMH would probably attribute this to an unspecified risk associated with unexpected inflation. Others have attributed this to the myopic outlook of the typical market participants. The next paper to be discussed also deals with the seemingly short term outlook of the market.

OPPENHEIMER AND SCHLARBAUM (1981) Benjamin Graham was probably the most respected non-academic writer on the stockmarket who had ever lived. Much of the current fundamentalist investment philosophy could be said to have stemmed from his writing on the subject, both serious (i.e. Graham and Dodd (1934) and its subsequent reissues) and for the laymen (Graham (1973)). Through the five different editions of the second book, "The Intelligent Investor", the recommendation was to invest in a relatively small portfolio (10-30) of good quality defensive stocks and avoid other more fashionable offerings of the market. His stock selection procedure relied heavily upon choosing stocks with a large capitalization relative to their industries, selling at low multiples of asset value and low multiple of earnings with a longish history of earnings and dividend payments. Such stocks should then be held for long term appreciation and would only be rejected if they failed to provide positive return after several years (Graham suggested three as a guide). This set of investment philosophy has become the guideline for a large number of investors in the US and some of them have been very successful.

Oppenheimer and Schlarbaum tested Graham's selection method (using yearly rebalancing) on the companies listed in the Moody's Handbook of Common Stocks and S & P's Security Owner's Stock Guide for the period 1956 through 1975. Their conclusions are quoted partially below :-

"The results presented in this paper indicate that positive risk-adjusted rate of return were available to investors who used the common stock selection method that Ben Graham suggested.....for the period 1956 through 1975. Rates of



return were 3 to 3 1/2% per year higher than those achievable by holding a market portfolio.....when frictionless market situation was approximated.....The frictions taken into account in the typical investor's situation did reduce the comparative advantage.....Nonetheless, a "typical investor" could have still earned rates of return which were higher....."

"Creation and maintenance of a portfolio in accordance with Graham's suggestion is an easy task which consumed very little time. Our experience indicated that one hour per year should be enough...."

As the authors suggested, there might be other explanations for the results of this study but they were inclined to think that it demonstrated an instance of inefficiency of the semi-strong form.

#### 4.5.2 - EVIDENCE OF INEFFICIENCY FROM OTHER MARKETS

So far, we have looked at only papers concerning the US and the UK markets. In recent years, an increasing number of papers on the other markets of the world has started appearing. While some of the papers which have appeared on the smaller and less developed market of the world (e.g. Singapore and Kuwait) are not academically rigorous enough,\* there are several papers written on the European markets which merit discussing. It is to be admitted that most of these papers still used very simple research methodology compared with the latest crop of papers from the US. However, even with very simple methods, methods which are generally thought to be inadequate for uncovering inefficiencies in the US, indications of non-randomness were revealed. Four papers will be briefly discussed next.

THEIL AND LEENDERS (1965) This was produced in response to the wellknown article by Fama called "Tomorrow on the New York Stock Exchange" and is hence called "Tomorrow on the Amsterdam Stock Exchange". Fama was not able to uncover any sign of non-randomness. The method consists of examining the predictability of the different fractions of stocks on the market which increases, decreases or remains the same. The authors found considerable positive dependence in the successive values of the proportions of stocks in each category. In essence, they found that if the market rose yesterday,

\* See footnote at the end of chapter



it had a strong tendency to rise today and vice versa.

CONRAD AND JUTTNER (1973) They carried out two series of tests for randomness on the German stock market:-

- (1) Total Number of Runs, Runs Up and Down, Different Signs
- (2) Serial Correlation.

Based on their findings, they rejected the Random Walk Hypothesis (the EMH did not appear to have yet made an impact there in 1973).

WEISS (1975) re-examined the validity of Conrad and Juttner's paper and supported their conclusion.

SOLNIK (1973) This is a very comprehensive piece of work in terms of the number of European markets studied. The author used simple serial correlations to examine the dependence in daily and longer period stock prices for eight European countries -- France, the UK, Germany, Italy, the Netherlands, Belgium, Switzerland and Sweden. The results showed the apart from the UK and Netherlands, there was a very large degree of non-randomness in all markets for the daily prices, much greater than that of the US market.

There has been limited amount of research of high academic standard from the Far Eastern markets which are even less developed than the those of Europe. One would conjecture that these markets are likely to show some signs of inefficiency as well. Dawson has produced several papers on the subject and his conclusions are in general agreement with the hypothesis of this dissertation. In DAWSON (1982), he was able to show that there are some signs of inefficiency in the form of abnormal return to be gained from following a stock broker firm's recommendation. In a later paper, DAWSON (1984) he further showed that such inefficiency appeared to be lessening over time.

#### 4.5.3 - OTHER STATISTICAL AND TECHNICAL EVIDENCE

In this section we shall look at papers concerned with the statistical and technical aspects of stock prices published during the Seventies and Eighties. There are fewer of them than during the first period. In the first part we shall look at some papers concerned with cyclicalities in stock prices and in the second part,

we shall look two papers which provide very interesting twists to similar tests carried out in the earlier years of EMH research which had been generally accepted as proof of market efficiency.

(A) The "Turn-of-the-Year", "Monday" and "Presidential Cycle" Effects

ROZEFF AND KINNEY (1976) This is a highly significant paper which led to a burst of research activity in this area. Rozeff and Kinney were able to show that although the classical autocorrelation test was not able to reveal any cyclicity, non-parametric tests revealed statistically significant higher January returns compared with the other months of the year. OFFICER (1975) was able to demonstrate similar "turn-of-the-year" effect for Australian stock prices although there was a similar and more significant higher return for July.

These findings seemingly contradict the whole basis of EMH and as a result, EMH supporters have tried to provide some explanation for this effect. Among the best accepted possible explanations are the "Tax Loss Selling" explanation argued by ROLL (1983) and the "Small Firm" explanation argued by KEIM (1983). However a large number of research findings published during the last two years seemed to have overturned these explanations.

As there are many papers on the topic, only a small number will be mentioned here. BROWN, KEIM, KLEIDON AND MARSH (1983) conducted a test for both these effects. They strongly question the tax-loss selling hypothesis and found that although there was a consistent premium on return on small firms, this cannot be used to explain the turn-on-the-year effect. The authors concluded that they were at a loss to explain these effects.

GULTEKIN AND GULTEKIN (1983) tested for the turn-of-the-year effect over a dozen countries. They were able to show strong evidence for this effect in most countries tested. The effect did not appear to be linked to firm size. In a similar fashion, BERGES, McCONNEL AND SCHLARBAUM (1984) found strong evidence for this effect in Canada. Again, the authors refuted the tax-loss selling hypothesis (in part because Canada did not institute capital gains tax until after 1974).

As things now stand, it would seem that the turn-of-the-year effect is one of the most serious anomalies to emerge questioning the validity of EMH. In addition to the turn-of-the-year effect, researchers in the recent years had uncovered the "Monday" effect which is just as difficult to explain under the umbrella of EMH.

CROSS(1973) was the first person to uncover the seemingly impossible fact that stock prices had a strong tendency to rise on Fridays and a similar tendency to fall on Monday. KEIM AND STAMBAUGH (1984) conducted a large scaled long term test (1928-1982) and were able to show that the last trading day of the week, irrespective of whether it was Saturday or Friday, provided higher return. Again, EMH supporters have not been able to provide a satisfactory explanation.

ALLVINE AND O'NEILL (1980) Granger and Morgenstern's tests based on spectral analysis are the sources of evidence often quoted in support of efficient market hypothesis. In their study of 1963, they found a long term cycle in stock prices which followed the business cycle though they denied its significance. For a long time, it had been assumed by most workers in this field that Granger & Morgenstern were correct until the recent paper by Allvine and O'Neill. Their paper reported on both the results of their spectral analysis on the stock price series as well as a direct test of a trading strategy based on the cyclicity discovered. The spectral analysis of the price series from 1948 to 1978 showed a pronounced peak at 208 weeks as well as at the harmonics of this period. The direct test was based on a comparison of a "trading and T-bills" strategy against a "buy-and-hold" strategy. Their results seem to indicate that there existed a fairly clearcut four year cycle which coincided with the presidential election cycle. (It is perhaps worth pointing out that Wall Street wisdom also believes in the existence of just such a cycle). They gave two reasons why their results turned out different from those of Granger and Morgenstern. Firstly, they had incorporated a phase shift in 1960. Secondly the Fourier transform carried out was based on a much longer correlogram (416 weeks) because a shorter correlogram can mask a long term cycle.

#### (B) Other Papers of Interest

ROSENBERG AND RUDD (1982) The evidence most commonly used as "proof" of market efficiency during the earlier years was the fact

that serial correlation studies had shown that there was little serial correlation between successive price changes. But it is conceivable that the total return may be made up of more than one component each with positive or negative serial correlation, which together, nearly offset one another, resulting in near zero serial correlation. Rosenberg and Rudd used a sophisticated multiple regression technique to study this residual item. They decomposed the total monthly return of just under 1000 stocks for 92 months into both factor specific return (based on 55 descriptors) and firm specific return. The results of the study uncovered a hitherto unrealised fact. While the total return may not be serially correlated, its two components do not necessarily show likewise. The authors concluded thus : " For total return, its(the return) distribution is indistinguishable from pure randomness. For factor related return, there is substantial positive serial dependence which is nevertheless not quite statistically significant. Finally for firm specific return, there is negative serial correlation which is stable over time and highly significant.".

The authors went on to state that while the predictive power of a model based on the results of the study was not big (in the order of 1.2% of the monthly variance), the amount of pricing error was not the same for all stocks. Nor was the amount of pricing error a constant factor of price. They pointed out that by choosing those stocks with high specific variance, it would be possible to make abnormal profit. This conclusion appears to be in line with the evidence presented so far. That is, some securities are more efficiently priced than others.

**SHILLER (1981a and 1981a)** One characteristic that is common among all stock markets is the great volatility of stock prices. Thus on the NYSE, the long term annual return had been about 9% while the annual standard deviation had been over 20% during the same period. The volatility at different place and time can be considerably higher than this. If the stockmarket is efficient, the variations in prices have to be explained by the random arrival of new information having a bearing on price formation. In order to explain such big movement in prices, the new information "bits" which are being received have to be very large as well. It is difficult to conceive of pieces of information which can cause a 50% increase in price over a two months' period as happened in August/September 1982. However, it is impossible to prove that the ex post price distribution is the

direct result of certain information received.

In spite of the long standing theoretical models of stock price determinants by WILLIAMS (1938) or MILLER AND MODIGLIANI (1961), it has been impossible to prove that in the real world, stock prices are indeed determined by either of these variables. However, if one were to accept the validity of these models, then it is possible to draw some conclusions regarding the relationship between the fluctuations in interest rate or dividend and the fluctuation of stock prices (as the dependent variable). Shiller's work showed convincingly that the ex post fluctuations in stock prices could not possibly be explained by the fluctuations in these two independent variables. Shiller concluded that this was a clear indication that the market could not be efficient and he attributed this pattern of fluctuations to the market's tendency to follow fads or to act irrationally. This is probably an over deterministic conclusion as commented upon by both Lintner and Long in the post-article "Comments". However, Lintner did point out that the result indicated that a hyper rational and efficient market could not be supported. But if one were to accept that the information sets do change over time and that market participants exhibit learning behavior, then the result of Shiller's study could be used to support such a weaker form of efficient market.

#### 4.6 - GENERAL VIEWS OF SEVERAL ACADEMICS AND WRITERS

There are few areas of academic research in which the view of the workers in it had been so different from the view of the professionals in the same area. This dichotomy was especially marked in the early years of EMH. Fortunately for the writer of this thesis, there are increasing signs that the two sides are moving closer together. More and more researchers are beginning to accept the view expressed by financial writers such as Seligman of the Fortune that the EMH is not a true description of the real life situation. At the same time, the views of the academics have found a degree of acceptance among the professionals who (like Seligman although to a lesser extent) find that the EMH is a useful starting point for understanding the stockmarket. The emergence of index funds in recent years is certainly a pointer to this change of mind. In the



last section of this chapter, the views of several noted academics in this field will be quoted. Most of these quotations are taken from business magazines rather than learned journals since the latter do not usually print interviews.

Sharpe, in an interview with E.H. Ehbar published in Fortune of the 26th February 1979, had this to say, "..... I have second thoughts about the efficiency of the market..... I still think it is highly efficient, but I can no longer adhere to the view that it is hyperefficient and never process its information wrongly.....there has to be an incentive for people to do research, and in the equilibrium, there have to be some managers who can earn large returns so as to cover the cost of their research."

Beaver, in the concluding remark of the chapter on market efficiency in book (1981a ppl80) says, " In closing, this chapter takes no position as to the efficiency of the market with regards to any specific information system. The nature of the empirical evidence and the interpretation is likely to change over time and is subject to continuing debate and controversy."

Kuehner & Renwick, in the conclusion to an extensive review of available evidence for and against EMH published in LEVINE (1980 ppl59), declare that ".....the jury must render the identical verdict for both sides: 'SCOTCH VERDICT - NOT PROVED'".

Malkiel, in an interview in the Forbes Magazine of the 26th of March, 1984 declared that ".....the stockmarket resembles more Random Walk with a crutch rather than pure Random Walk". While this statement is a little cryptic, this writer takes it to imply that since a drunk with a crutch cannot move very far, such a model of EMH probably resemble something like Cootner's "random walk with reflecting barriers", a model which is close to what is hypothesied in this work.

Perhaps the last quotation should be from Graham. In an interview with Financial Analysts Journal shortly before his death after 50 years of observing the stockmarket (Sept./Oct. 1976) he said (among other things) : " ....Most of the time common stocks are subjected to irrational and excessive price fluctuations in both directions, as the consequence of the ingrained tendency of most people to speculate or gamble - i.e. to give way to hope, fear and greed.....



I am no longer an advocate of elaborate techniques of security analysis.....This was a rewarding activity, say, 40 years ago.....but the situation has changed a good deal since then. To that very limited extent, I'm on the side of the "efficient market" school of thought.....

We are just finishing a performance study of these approaches (i.e. investment methods based on the philosophy suggested in his book) over the past half-century - 1925-1975. They consistently show results of 15% or better per annum, or twice the record of the DJIA for this long period. ....At the bottom it is a technique by which the investors can exploit the recurrent excessive optimism and excessive apprehension of the speculative public."

#### FOOTNOTE

Although it is true to say that much of the work which have emerged from the less developed countries are not of a very high academic standard, some of the work are interesting nevertheless as they provide some insights into these markets. The following two papers from Singapore are typical of the papers in terms of coverage and academic rigour.

HAI HONG Review of Economics and Statistics, November, 1978 (pp 619-621). This short paper reported on the results of serial correlation and run tests conducted on the stockmarket indices of four Far Eastern markets - Australia, Hong Kong, Japan and Singapore. These tests were based on the daily and weekly indices for the period of September 1973 to March 1976. No mention was made of the lag over which the serial correlation tests were run but it can be assumed to be one period in each instant. The serial correlation of the daily indices varied from 0.093 (Japan) to 0.233 (Australia). These translates respectively to 2.4 times the standard error and 6.0 times. The daily runs tests showed that the Australian index had significant departures from normality. Neither the weekly serial correlation nor runs tests revealed any significant departure from independence.

The author concluded that it was probably not possible to beat the market in these countries over the short run.

K K LEONG Securities Industry Review, Volume 9, No 1 (pp 6-15).

The author examined the efficiency of the Singapore stockmarket by carrying out serial correlation and runs tests on the monthly stockmarket indices and the prices of 20 different stocks from the period of January 1973 to December 1980 (96 observations). The serial correlation tests on the indices were carried out for the lags of 1 to 5 periods. Apart from the Finance Index at the lag of 1 period, none of the indices revealed any significant correlation. Of the 20 stock price series only 3 showed any significant departure from independence.

The runs tests indicated that none of the indices showed any significant departure from independence. Of the stock price series tested, only four of them showed similar significant departure.

The author therefore concluded that the Singapore market was weak form efficient.

## CHAPTER FIVE

### LITERATURE REVIEW - PART III RESEARCH AND PUBLICATIONS PERI- PHERAL TO THE DEVELOPMENT OF EMH

#### 5.1 - Organisation of Chapter Five

In the last two chapters, the history of the development of EMH has been traced. Such development, however, was perhaps only possible because of two important environmental reasons. Firstly, during the last quarter of a century, large computerised databases were set up. Through these databases, researchers were able to carry out extensive statistical and economic analysis of the stockmarket on a scale and in such detail which had been till then impossible. Such research gave rise to a far better understanding of the nature of the stock market. Subsequently such understanding became well propagated among the investors at large such that they now have a much better expectation with regard to the risk and return involved. Concomitantly, there were a great deal of parallel developments in the fields of microeconomics and finance, in particular the areas of risk/return and the pricing of capital assets. It is arguable that EMH would not have been developed in the absence of these developments.

These developments in the academia were paralleled by similar large improvement in the knowlegeability of the investors as a whole. By all accounts, the investors' knowledge and perception of the market has improved vastly since the Twenties. It is obvious that the investors of the earlier era could not be as sophisticated. Investment approaches which are currently out of favour among the academics were widely believed to have been useful in providing abnormal return from the stockmarket.

Since one of the purposes of this thesis is to analyse the abnormal return obtainable using different investment methods, it is important to develop an understanding of the philosophy and methods of the two alternative schools of investment. It is also worth considering that

it is possible that these schools might have reflected the market conditions existing during the earlier years of this century. If there are similarities between the present Malaysian market and the then American situation, it is possible that these alternative investment methods may be applicable locally.

Publications connected with the theoretical development of EMH have been extensively discussed in the two previous chapters. This chapter will therefore start with two important publications which laid down respectively the "theories" of technical analysis and fundamentalism. In addition, two other papers which, in a sense, lend further support to the fundamentalist school will also be examined. In its second part, this chapter will examine publications on the "environment" of investment which provided workers in this area a better understanding of the nature of the stockmarket. In the last part, this chapter will examine publications in connection with the development of Capital Asset Pricing Model (CAPM), its companion Market Model, the Arbitrage Pricing Theory and CAPM's validity when using it to adjust security returns. The rest of this chapter is therefore divided into the following sections:-

- 5.2 : Publications on alternative schools of thought regarding stockmarket behavior;
- 5.3 : Publications on the "environment" of investment. That is, publications examining the various variables connected with the stockmarket investment;
- 5.4 : Publications connected with the development and critical examination of CAPM.

## 5.2 - Publications connected with Alternative Schools of Thought Regarding Market Behavior

RHEA (1932) This is generally acknowledged to be the first book which properly laid down the principles of technical analysis originally stated informally by Dow. Rhea himself admitted that his book was largely a distillation of the earlier writings of Nelson(1902), Hamilton(1929) and various editorials from the Wall

Street Journal written by Hamilton during his time as editor of the newspaper (1903-1929).

Thus technical approach can be said to be the oldest approach to stock investment. While it still has many followers today, its period of greatest following was probably in the first few decades of this century, before the emergence of fundamentalism. For thirty years or more, it was the only "rational" approach to stock investment. Although it is largely discredited today, in its days it must have been viewed as a great improvement on no method at all. In today's environment, it is easy for students of the stockmarket to dismiss technical analysis as mere sorcery. It is perhaps difficult for a present day researcher to fathom what the stockmarket was like in the early part of this century. Given the calibre of people like Dow himself and Hamilton who laid down these basic principles, it may be premature to conclude that even then technical analysis had not been of any use in obtaining abnormal profit.

In one aspect, Dow Theory reflects exactly the thinking of present day supporters of EMH as voiced by Dow himself : "The Averages (stock market indices) discount everything". The idea that the market as a whole has far superior knowledge than the individuals and that the price of the stocks reflects all that the market knows about it has as much acceptance today. The major difference in the two approaches is that technicians believe that the future could be foretold by the past. Technicians base this belief on the "fact" that market operators are creatures of habit such that in similar situations, they tend to behave in the same predictable manner. It is perhaps useful to speculate on just how "investors" would behave in a highly unsophisticated market. In the absence of any "good" publication or a strong theory of stockmarket behavior compounded by the lack of understanding of financial reports and continuously assailed by rumours and hearsays, how would a typical investor in such a situation behave? Would it not be possible that he would tend to revert to a more visceral reaction to various market movements? A reaction which would probably be far more predictable than one which is based on a more "rational" basis.

It would be beyond the scope of this thesis to proceed further along this line of thinking apart from saying that it would be interesting to test technical analysis under conditions closer to those under which it was formulated. As has been shown in Chapter two the

Malaysian market at present appears to resemble to some extent the US market of the period when Dow Theory was formulated and tested. It is possible that some of the important principles may still be applicable today or perhaps, even more likely, in the recent past.

GRAHAM & DODD (1934) (GD) This book could be said to have created a new discipline as well as a new industry. It had been through three major revisions as well as the addition of one more co-author (Cottle) since its first publication. Its central "philosophy" has however remained largely unchanged. The idea of "intrinsic value" for stocks has been previously examined at length in this thesis and it will not be elaborated here. The method recommended by GD and the circumstances which could lead to this method being applicable will be examined instead.

GD's method relies on the belief that it is possible to determine the relative cheapness of a share by studying its earnings(or dividend) multiple. Investors should buy a share when its multiple has fallen to a low enough level if, in addition, the company meets certain criteria for financial soundness. Each edition of the book uses slightly different rate but we can use as illustration the rate proposed in in the latest (1962) edition. In this GD suggested that the purchase price should be between 7 and 20 times the average of the next seven years' earnings with a mid point of 13. Appropriate adjustments to these multiples have to be made to take into account the growth rate of the company (for example, they recommended that one should not pay a greater premium than 50% for growth stocks). There are several major shortcomings in these selection criteria in the light of later market conditions and economic thinking. Firstly, the method does not take into account the possibility of changes in the inflation rate. Secondly, the growth rate of the firm is not explicitly taken into account in the valuation. Thirdly, there is no explicit allowance for risks.

However, even with these inherent shortcomings, it is conceivable that there are circumstances in which such a stock selection method could have worked. This method is implicitly based on several important assumptions about the market and if these assumptions are correct then the method may be workable. Firstly, the method assumes that the vast majority of the market participants are not rational. Their expectations and assumptions are uncertain and varying. As a result, the price of shares tend to fluctuate randomly but such



fluctuations are bounded and the stock price will eventually return to its intrinsic value. Secondly, the method assumes, with the proviso that one buys only the shares of dominant and financially sound companies, their future earnings are predictable. Thirdly, the method assumes that there would not be large changes in the future inflation rate such that the basis of valuation would become totally meaningless (as it did during the early Seventies). Lastly, the method implicitly assumes that the economy would continue to grow steadily in all sectors and that if there were to be any structural adjustment, such adjustment would be slow enough for the companies affected to be able to "escape" to another sector. It is notable that these assumptions were largely correct during the Thirties and to a similar extent during the Fifties and Sixties.

Since then of course, the economic situation has changed enormously in the developed world. There are few companies which can take future earnings for granted. There have been periods of severe inflation and recession. There have been also major structural changes in the economy and many blue chips had performed very badly. The work of Oppenheimer and Schlarbaum (1981) notwithstanding (the work used data from 1956-1975), it is likely that GD's method would not have worked well in the past ten years. As with the Dow Theory, if it is possible to locate stockmarket conditions close to those assumed by the originators of fundamentalism, it would be worthwhile to test GD's method, perhaps with some modifications to allow for changed circumstances.

WILLIAMS (1938) This is a highly significant publication which laid down many of the basic principles of the rational approach to stock valuation. It would not be possible to summarise the whole book within the limitations of this thesis given that this book had the following stated objective "To outline a new subsience that shall be known as the Theory of Investment Value and shall comprise a coherent body of principles.....". This book may be divided into two parts - the first being a description of the principles being postulated and the second being case studies examining how these principles may be applied to real cases in the investment world. The first part is made up of several chapters examining various topics, viz the theory of speculation; the pure theory of investment value; and the economics of interest and dividend. Of these, Chapter Five, "Evaluation By The Rule Of Present Value" can be said to be of the greatest importance to the world of finance. The other chapters in

the first half of the book were largely concerned with applying modern scientific modifications to GD's method. The two most important being the use of dividend instead of earnings as the basis of valuation and the use of discounting for future sums.

The work of Williams has enormous influence on the thinking of fundamentalists until today. All commonly used "intrinsic value" type methods of stock evaluation are based on his method (i.e. the discounting of a future stream of dividends). The somewhat surprising adoption of dividend as the basis of valuation is perhaps not that unexpected considering the market condition of the time. The stockmarket of the Twenties, and to a lesser extent, the Thirties can be said to contain many traps for the less knowledgeable investors. There were too many instances of dubious earnings and firms of dubious design. In the light of present knowledge, dividend is no longer of importance in the valuation of firm. This will be examined in detail in the next subsection.

In his book, Williams also preempted the much later work of Markowitz in suggesting that the discount rate used in the evaluation of stocks should contain a risk premium to take into account the degree of risk involved in the investment. While there was no further discussion on the appropriate size of risk premium to use in each case, it is still a revolutionary suggestion nevertheless. However, one of its main tenets did not stand the test of time very well. The use of dividend as the basis of valuation was to be overturned by the next paper.

MILLER & MODIGLIANI (1961) (MM) When this paper first appeared, it was considered highly revolutionary and caused much furore in the academic world and was much derided in the business world. However, a scant twenty years later, its basic idea that "dividend does not matter" has become almost fully accepted by the academia and by many practising managers. There are highly valued companies in existence today which have never paid a cent of dividend (e.g. DEC and Intel), a situation which would have been inconceivable twenty years ago.

In its initial form MM postulated that given perfect market, rational behavior and perfect certainty, the value of a stock is the discounted present value of what one may call the nett cashflow after capital investment ( or in MM's parlance  $\{X[t] - I[t]\}$ ). MM showed that all other approaches to stock valuation - cashflow, dividend, earnings and earnings plus investment opportunities - are

economically the same.

Later in the paper, MM were to relax the initial stringent assumptions and were still able to show that dividend per se is irrelevant to stock value. Later work on the relationship between dividend yield and stock return (which have been previously discussed) were to show that MM were probably correct in their theorising.

It is interesting to speculate if there exists or ever existed a stockmarket which is so unsophisticated that it would rely purely on dividend yield as the investment criterion. If such a market exists, the demand for low dividend shares would fall such that its dividend yield would equilibrate at the required level. Hence at equilibrium in such a market, all shares of the same risk class would sell at the same dividend yield. It is doubtful if such an unsophisticated market could exist since it is a well known fact that dividend yield does vary cross-sectionally and longitudinally. If there is any degree of unsophistication regarding dividend, one would expect it to exist in a less obvious manner. A straight forward dividend yield test is not likely to uncover such inefficiency.

### 5.3 - Publications on the Investment Environment

#### 5.3.1 - PUBLICATIONS ON EARNINGS STABILITY

If dividend information is not relevant in investment decision making, earnings information is the obvious alternative. In order for historical earnings figures to be useful for stock valuation, they must be useable for the forecasting of future earnings. This would imply a high degree of longitudinal consistency in corporate earnings. The papers to be discussed in this section show that, on the whole, corporate earnings, whether in Britain or the US, do not appear to be very consistent.

LITTLE (1962) AND LITTLE & RAYNER (1966) These two publications may be taken together since the second publication was an expanded version of the first. Much of the materials contained in the first was duplicated in the first half of the second. Little (1962) must be one

of the most cited papers in the field of finance and has spawned many "me-too" copies since its first appearance. The main objective of these two publications was to survey the stability of earnings growth rate in the UK. The main findings of the research were as follows:-

- (a) There was virtually no growth consistency in the short run; and
- (b) There appeared to be little more consistency over the long run.

The main conclusion arrived at by the authors was that the work of financial analysts was logically worthless. There is little doubt that these works gave a great deal of impetus to the development of the random walk hypothesis. This conclusion may be over strong, especially if it were to be applied on a global basis. As shown in the last chapter, it appears possible to make reasonably accurate short term forecasts based on interim results and that some analysts are capable making of reasonably accurate forecasts. The next paper was to provide, at best, lukewarm support for these findings.

LINTNER & GLAUBER (1969) This study examined the long run earnings consistency in the US using Little's method. The main difference was that a longer period of study was carried out and the earnings growth was stated in logarithmic rather than arithmetical term. Their conclusion was much more cautious than that reached by Little. They concluded that whilst there was a lot of randomness in the data examined, it would be premature to conclude on ".....the irrelevance of good management, superior product market position, the insights and judgement of good financial analysts...."

This difference in conclusions reached could, in part, be due to the different samples studied. The performance of the US companies in the Fifties and the Sixties was superior and more consistent than that of the British. In addition, there was no lack of innovative, high growth firms which produced consistent year after year good results, even among the larger companies (firms like GE, DEC, HP IBM and the like).

BALL & WATTS (1972) This later work gave support to the idea that the time series of aggregated corporate earnings are best described by a submartingale. This paper however, used the averaged earnings of the S & P firms rather than the earnings series of individual companies. This action obviously masked the existence of any individual earnings consistency.

If the conclusion of a number of workers in this area is accepted, the earnings series of firms in the West would appear to be generated by something close to a submartingale. However, the evidence in support of this contention is not that strong in the US.

### 5.3.2 - PUBLICATIONS ON RETURN AND RETURN STABILITY

FISHER & LORIE (FL) (1964), (1968) AND (1970) It is difficult to estimate the influence and contribution of this pair of wellknown researchers. These three papers are but a small part of their vast contribution, both singly, together and in combination with others. The first two publications can be taken together and will be known as FL(64/68) and the third will be known as FL(70). Even before the findings of FL(64/68) are considered, these workers are highly significant for several important reasons. Firstly, they established the Centre for Research in Security Prices (CRSP) and created the CRSP tapes from which a whole stream of research papers has emerged. Secondly, they created a standardised algorithm for the adjustment of dividend and capitalisation changes. This project, like almost every other in the same area, depends on their algorithm. Thirdly, they established the standard method for the computation of the period-to-period security return which, again, has been adopted by most workers in the field.

It is obviously impossible to even summarise the quantitative findings of these papers and besides, they are too wellknown to require repetition. However, there are several qualitative findings which can be considered important. Firstly, they showed that over the long run, stocks provided a much higher return than any other securities thus providing evidence that investors are indeed risk averse and that common stocks are priced to compensate investors for this aversion. Secondly the papers showed that the period-to-period variability in return was considerable. The findings from these papers also have an important bearing on the direction of this project. A comparison of the year-to-year return between the earlier part of the research period ( the Twenties) and the later part provides evidence in support of one of the assertions of this thesis. That is, the characteristic of the US stockmarket had changed considerably between the earlier part of this century and the present time. The year-to-year variability of return and the average rate of return have become very much smaller. There is therefore some



evidence to support the contention that during the immature phase of a securities market, there is a greater tendency to greater volatility.

FISHER & LORIE (1970) This paper has a slightly different emphasis compared with FL(64/68). It examined the variability of the returns in addition to the returns themselves. This paper presented three separate sets of findings:-

- (1) A study of the frequency distribution of the return on individual stocks for periods ranging from one to 45 years;
- (2) A study on the distribution of the aggregated return from individual stocks; and
- (3) A study on the distribution of return from portfolios containing different number of stocks.

## 5.4 - Research Work Connected With Capital Assets Pricing Model

### 5.4.1 -INTRODUCTION TO SECTION 5.4

The EMH is a model for describing the performance of a security on a relative basis. That is, the return on a stock or a portfolio of stocks should not be significantly different than what can be expected from the market as a whole after suitable adjustment for risk has been made. This hypothesis is only testable in respect of a particular stock selection method if one has an expectation of what a portfolio based on this method ought to return given a certain return on the market. Only then can one compare the actual ex post return with what is the expected return and then come to some conclusion as to whether the difference between the two is statistically significant or not.

Another model is therefore required to specify what is the expected relationship between the behavior of the market and that of the stocks selected. The most commonly used conceptual model for specifying the relationship is the Capital Asset Pricing Model



(CAPM) or its precursor, the Market Model (MM).

The rest of this subsection is divided into three subsections in the following manner:-

5.4.2 - The Theoretical Basis of CAPM/MM

5.4.3 - The Shortcomings of CAPM/MM

5.4.4 - Recent Developments of CAPM

#### 5.4.2 - THE THEORETICAL BASIS OF CAPM/MM

CAPM/MM has its origin in the Portfolio Theory. According to Lorie and Brealey (1972), the Portfolio Theory is probably the second most important development in the field of investment after the EMH. According to them, the publication of Markowitz's paper in 1952 : ".....radically changed the thinking, not only about portfolio management but also about the entire field of investment as well." It is therefore appropriate to start this discussion with his paper.

MARKOWITZ (1952) This paper started with the simple assumption that the vast majority of investors are not pure profit maximisers and that they take into consideration the variability of return as well as the return itself when they were considering what asset to purchase. Markowitz called this the Expected Return-Variance of Expected Return Principle ( or E-V for short). He then demonstrated that provided the returns of asset were normally distributed, a portfolio of stocks would always generate a more efficient return than a single stock. By "a more efficient return", he meant either a higher return at the same degree of risk or the same return for a lower degree of risk.

Markowitz pointed out that the covariance between different pairs of stocks would be different from pair to pair. In order to maximise the benefit of diversification, the investors ought to select stocks on the basis of lowest pairwise covariation. He did realise however, that it would not be possible to achieve perfect diversification since there would always be some degree of covariation between stocks.

At this point, Markowitz's theory was only largely of theoretical interest owing to the impracticality of computing the covariance between every pair of stocks. Even the largest computer of today would be hard put to compute this. Further development in this theory was not possible until the appearance of the next paper.

SHARPE (1963) Sharpe proposed that the computation of the covariance between individual pairs of stocks could be considerably simplified if their relationship could be linked through the market as a whole. He called this the Diagonal Model (later to be known as the Market Model (MM)). Under the MM, the return on any stock is assumed to be dependent on a single outside factor and a random variable. Using Sharpe's original notation, the MM is given the following expression:-

$$R_i = A_i + B_i I + C_i$$

However, the MM is now more commonly given in the following form:-

$$\hat{r}_{it} = \alpha_i + \beta_i \hat{R}_{mt} + \hat{u}_{it}$$

where:  $\hat{r}_{it}$  = Expected return on security i for period t  
 $\hat{R}_{mt}$  = General market factor for period t  
 $\hat{u}_{it}$  = The return specific to security i for period t  
 which has expected value of zero

This simple model depends on the usual assumptions of no transaction cost and no tax as well as one more assumption. The additional assumption is that the investors are risk averse, single period oriented, expected-utility-of-terminal-wealth maximisers who select their portfolio on the basis of the mean and variance of the distribution of return on the stocks. It is important to note that in Sharpe's original model, the single factor to which all stock returns were assumed to be related referred to the overall market and economy factor which was deemed to have an effect on all stock returns. Later, in actual application of CAPM and MM, this factor was to become simplified to become merely a proxy of its original form. Market return (usually based on Fisher's "I<sub>mt</sub>") is used as the proxy. The

inadequacy of CAPM which is to become so prominent in the current investment debate could perhaps be regarded as having partly stemmed from this simplification. The market return alone cannot account for all facets of stock return.

The MM, though very useful from the practical research viewpoint, is not very satisfactory from a theoretical angle. It does not seek to explain the relationship between the risk an investor bears and the extra expected return he can derive from bearing that risk. Nor can this model be modified to include other forms of investment apart from stocks. Sharpe overcame these two difficulty by proposing a second model which was to become generally known as the Sharpe-Lintner-Mossin CAPM.

SHARPE (1964) In this model, Sharpe extended the applicability of CAPM by making two further assumptions;\_

- (1) Investors can borrow or lend unlimited amount at the same riskfree rate of interest: and
- (2) Investors have homogeneous expectations.

Sharpe showed that at equilibrium, it was possible to obtain an efficient combination of a risky portfolio and a single riskfree asset which will provide all investors with the desired optimal combination of risk and return. The relationship between risk and return could then be shown to be a linear one.

Sharpe also demonstrated that the riskiness of a stock could be broken into two parts - systematic and non-systematic. The non-systematic part of the risk would be uncorrelated with the non-systematic risk of other stocks in the portfolio. This risk could be reduced to zero (or nearly zero) by diversifying the portfolio. The systematic part of the risk could not be reduced by diversification and investors would have to be compensated for bearing this risk. The higher the sensitivity of a stock to the market effect, the higher would be the return on that stock. From a portfolio viewpoint, provided that portfolios are efficiently diversified, there will be perfect correlation between those similarly diversified portfolios.

LINTNER (1965) Lintner concurrently developed the same model as Sharpe and the CAPM is generally regarded as their joint product

(Sharpe-Lintner or S-L CAPM). His treatment of the subject was more extensive and vigorous and he also included a section on the use of CAPM in capital budgeting. The S-L CAPM is usually represented by the following expression:-

$$E(\hat{r}_{it}) = r_{ft} + [E(\hat{r}_{mt}) - r_{ft}] \frac{\text{Cov}(r_{it}, r_{mt})}{\sigma^2(\hat{r}_{mt})}$$

where:  $\hat{r}_{it}$  = Return on security i for the period t  
 $\hat{r}_{ft}$  = Return on the riskfree asset for the period t  
 $\hat{r}_{mt}$  = Return on the market for the period t

#### 5.4.3 - THE PRACTICAL SHORTCOMINGS OF CAPM

It would be beyond the scope of this thesis to discuss comprehensively the shortcomings of CAPM/MM as a model of stock return. For the purpose of the present study, it is more important to concentrate instead on the shortcomings of CAPM/MM when it is being used as a mean of adjusting stock returns to remove the market effect. This subsection will look at three major shortcomings of CAPM/MM.

##### (A) Accuracy of CAPM/MM as a Predictive Tool

Ideally CAPM/MM should be able to predict a substantial portion of the systematic movement of a portfolio and it ought to be able to do so consistently. However, much of the research work carried out in this area had not produced encouraging results.

KING (1966) This was the first paper testing the applicability of CAPM and it revealed two shortcomings of CAPM as a predictive tool. The study was based on data for 63 firms grouped into six industrial classifications for the years 1927-1960, divided into four subperiods. The first shortcoming of the model is that the proportion of the total variation of stock return which was explained by the market effect did not appear to be stable over time. The average coefficient of correlation declined from 0.58 in the first subperiod to only 0.31 in the last. Furthermore, there was considerable variation from stock to stock. For example, in the first subperiod, the range of the coefficient of correlation was from 0.16 to 0.84 and for the whole period from 0.14 to 0.76. The second shortcoming uncovered by King

was that there appeared to be a large "industry" factor which accounted for about 10% of the total variation. This finding anticipated the suggestion of some of the present workers that CAPM should be replaced by APT.

King also found that there was very good correlation between the S&P index and the market factor. This finding is of interest for two reasons. Firstly it seems to imply that to the investors at large, capital gains assume a far greater importance than total return. Secondly, it appears that a good representative index can be used as a proxy for the market factor without having to carry out complex computation to obtain the latter.

BLUME AND FRIEND (1973) The authors took a "new" look at CAPM and came to the conclusion that it must be rejected. They examined the ex post return on 12 portfolios of 82 stocks each for the period 1955-1968 divided into three subperiods. They applied the MM but nevertheless assume that the y-intercept was equivalent to the riskfree return. Using both equal weighted and value weighted portfolios, they found that the market factor was a very poor predictor of monthly return. The coefficient of determination ranged from 0.0 to 0.55 except in one instance when it was 0.98 (equal weighted portfolio from 1/65 to 6/66). In three cases, the computed beta was negative which is manifestly impossible (unless a majority of the 82 stocks in the portfolios are countercyclical type of stocks). They also found that the y-intercept was significantly different from the then riskfree rate in all subperiods. This foreshadowed later findings in the same area.

As a summary to this subsection, it has to be said that beta, as obtained by OLS regression of individual stock returns against market returns appears to be a poor predictor of the expected return on individual portfolio. On an individual stock basis, its predictive power would be even worse. Its value for adjusting stock returns to reflect market effect is therefore in some doubt.

#### (B) Stationarity of Beta

The CAPM was originally developed as a single period model. However, it is now usually used in the study of longitudinal price series. Such usage assumes that the computed beta is constant over the whole period of the study. Several pieces of work have shown that this

assumption is now open to question.

SHARPE & COOPER (1972) They carried out a comprehensive study on the stability of the beta ranking of a large sample of stocks (the author called this the "risk-return classes") They concluded that, ".....there is substantial stability over time, even at the level of individual securities." This conclusion appears to depend a great deal upon one's definition of the the word "substantial". A more stringent interpretation of the research findings would result in a very different conclusion. The following extract from their findings does not appear to support their conclusion.

RISK-RETURN CLASSES*	PROP. IN SAME CLASS AFTER		PROP. WITHIN 1 CLASS AFTER	
	ONE YEAR	FIVE YEARS	ONE YEAR	FIVE YEARS
10	0.74	0.35	0.91	0.69
9	0.50	0.18	0.88	0.54
8	0.41	0.18	0.83	0.45
7	0.36	0.13	0.78	0.41
6	0.35	0.14	0.78	0.39

\*The highest ranking class has the highest beta

BLUME (1975) This paper found that the beta of portfolios with extreme market sensitivity had a strong tendency to regress toward the grand mean of all the stocks. He divided stocks into portfolios according to their beta (four classes in the first subperiod of the research period and eight in the last). He found that the beta of the extreme portfolios had a strong tendency to converge toward 1. The following partial summary of the results gives an indication of this tendency.

PORTFOLIO CLASSES	SUBPERIOD		
	7/26-6/33	7/33-6/40	7/40-6/47
STUDY (A)			
1	0.54	0.61	0.73
4	1.49	1.42	1.47
STUDY (B)			
1	0.50	0.60	0.73
7	1.54	1.36	1.20



## (C) (I) Assumption of the Existence of a Riskfree Asset

The S-L CAPM assumes that there is in existence a riskfree asset which can be purchased by the investors and hold in conjunction with a risky portfolio such that they would each own a personally optimum portfolio. From this assumption, the actual riskfree rate is used for the computation of the expected portfolio return. From a theoretical viewpoint, the S-L CAPM is sounder than the MM. However, from the viewpoint of this study, it is not feasible to use the S-L CAPM. The reason being that there does not exist a riskfree asset (other than cash) which can be purchased by the general public. The Malaysian Treasury only sells its financial instruments to financial institutions. Nor is there is secondary market for Treasury bills or bonds. However, as it serendipitously turns out, the basic assumption of the existence of a riskfree asset the return of which affects the return on all other assets has been repeatedly shown to be far from robust as the two following papers will show.

BLACK, JENSEN & SCHOLES (1972) In this comprehensive study of the applicability of CAPM, the authors came to the conclusion that the CAPM failed to adequately explain security return. Their results showed that the return obtainable on low beta stocks to be higher than expected and the return on high beta stocks to be lower than expected. They also found that the return on riskfree asset as obtained by regression was far too high when compared with the actual riskfree rate of the period.

BLACK (1972) This paper attempted to show that even without a riskfree asset, the central provision of CAPM would still hold. Black showed that it was possible to contrive an efficient portfolio from a linear combination of the market portfolio and a single minimum-variance portfolio of risky assets. The relationship between return and portfolio beta would still be a linear one. In this case, however, the slope of the efficiency set would be smaller than in the case where there is a risky asset. This smaller slope would perhaps explain why is it that the previous paper had found that the returns on low beta stocks were too high and vice versa.

## (C)(II) The Testability of CAPM

The two above papers came under strong criticism by Roll (1977) who maintained that the rejection of the SL-CAPM by Black, Jensen and Scholes (among others) arose out of the misspecification of the market proxy. It was this misspecification which created the bias and nonstationarity discovered by the latter. Roll asserted that the CAPM in its present form was untestable. His assertion arose out of several conclusions which he arrived at after a lengthy discussion. First, he concluded that it was impossible to test for the linear relationship between beta and expected return. Second, he concluded that it was possible to generate an infinite number of "market" portfolios all of which could be made to produce a sample beta which would give rise to a linear relationship between asset return and the beta so derived. Third, he concluded that EMH was only testable if all individual assets are included in the "market" portfolio.

While this paper superficially seems to be a critique of the earlier tests on the validity of CAPM, its major implication seems to be that EMH is not a workable model under our present state of knowledge and method.

#### 5.4.4 - SUMMARY COMMENTS ON SUBSECTION 5.4.3

In conducting tests to prove or disprove the validity of EMH, it is inevitable that on occasions, CAPM/MM has to be used to normalise stock return. However, the use of CAPM/MM has a major difficulty. The problem being that a test for the validity of EMH is essentially a two staged test. In the first place, the researcher has to be sure that CAPM/MM does indeed correctly specify the relationship between a stock's return and the market return. As things now stand, the researcher has to perform the test on the validity of EMH without being very sure that this relationship is indeed correct. Usually tests on the validity of EMH rely on being able to show that it is not possible to obtain abnormal return with any stock selection method. In the event that one test does indeed show such "inefficiency", the researcher could not really be sure that the test shows conclusively that EMH is not valid in this instance. An example would illustrate this. It is a well known fact that in the US, the stocks of small firms usually provide much higher return than those of large firms. But could this fact be used as evidence of

inefficiency? It could be said instead that there is an unspecified risk premium involved in the investment in small firms.

Even if we ignore the problem posed by the possible existence of risk factors not specified by SL-CAPM, the use of this model for normalising stock returns creates other practical and theoretical difficulties as have been shown in the previous section. Since some method of normalisation of returns has to be used and given the fact that APT (to be discussed in the next section) is as yet not generally acceptable, the choice is now one of between the SL-CAPM and the MM.

At this point it is perhaps worth reiterating the purpose of normalisation of returns in efficiency tests. This can be said to be for the removal of non-stock specific return components from the total return experienced by the stocks. Under the present state of knowledge, it is very possible that there are other return components over and above the market component which have to be removed but there is no acceptable method for doing so. We should therefore concentrate on the removal of the market return component which is what CAPM/MM is designed to do. From a theoretical view point, the removal of the market return component alone is not too great an oversimplification. Subjectively, it would seem that most investors in the stockmarket are much more interested in the "relative" return of various stocks rather than the relative return between various assets. This is especially true in Malaysia where there is paucity of investment avenues open to the ordinary investors. If we want to merely remove the market effect, it would seem that MM is the better model for the normalisation of stock return.

Most studies on the validity of EMH had used MM for return adjustment. Black, Jensen & Scholes in fact found that MM appeared to have greater predictive power than CAPM. For this reason and the reason of the non-existence of riskfree asset locally, whenever it is required to adjust the return on stocks, the MM will be used.

Thus it would seem that the use of CAPM/MM for adjusting stock return is fraught with difficulties. As will be shown in Chapter Six, the coefficients of determination of the OLS model used for computing betas are even lower in Malaysia than that of the US. Given such a

state of affair, it is probably better that the use of CAPM/MM be minimised in this project. There are several acceptable ways of doing so. Firstly, the test can be so designed such that the returns under the stock selection method being tested (e.g. moving average method) are compared against the "buy-and-hold" returns obtained on the same stocks as controls. Secondly, the test can be designed such that the magnitude of the returns on the stocks is not the critical factor being tested (e.g. test for periodicity). Thirdly, it is possible to compare the performance of two portfolios of stocks with comparable average beta using different stock selection methods.

However, there will still be occasions when CAPM/MM will have to be used. In order to minimise the effect of non-stationarity, moving regressions on moving blocks of data can be used instead of one monolithic block. In addition, Dimson's (1979) AC method of correction will be applied in order to improve the accuracy of beta computed for stocks which are less frequently traded.

#### 5.4.5 - IMPORTANT RECENT DEVELOPMENTS RELATED TO CAPM

The unsatisfactory state of CAPM has led to a great deal of work in the recent years to seek a replacement. Much of the work centres around the Arbitrage Theory of Capital Asset Pricing (APT). It is still too early to know whether CAPM will be replaced by APT or something else. Nevertheless, it is important to take a look at this development since it is directly related to the shortcomings of CAPM.

ROSS (1976) This is the paper which set out the theoretical foundation of APT. It would be well beyond the scope of this thesis to give it anything more than a brief examination. In essence, APT states that the expected return on a risky asset is provided by the following expression:-

$$E_i = E_o + \beta_{i1}(E_{p1} - E_o) + \beta_{i2}(E_{p2} - E_o) + \dots + \beta_{ik}(E_{pk} - E_o)$$

where:  $E_i$  = Return on asset i  
 $E_o$  = Return on asset with zero beta  
 $E_{p1} \dots E_{pk}$  = Expected returns due to factors 1 to k

The problem about APT for practical usage is that the theory does not specify what are the factors which are thought to have an effect on stock return. In the case of CAPM the common factor, that is, market return, is directly observable. Researchers who are intent on testing the validity of APT are left with two alternatives. First, they can

personally choose those factors which they believe have an effect on stock return and then proceed to test out their belief by using multiple regression. The second alternative is to use computerised factor analyses and let the computer carry out the analyses of the variance-covariance matrix which best fit the available body of data. The first alternative is not very satisfactory since there are so many possible combinations of factors involved. The second is inherently even less satisfactory since it is largely a "blind leading the blind" approach to the problem.

As Ross himself pointed out in his follow-up paper (1978), the factors that had so far been tested for their effect on stock returns ranged from inflation to international finance, taxation and even human capital. Given the unsatisfactory state of CAPM, Ross had expected that many researchers would attempt to provide something better, but to date the amount of concrete result has been small. Although Ross's paper was slightly outdated, his conclusion regarding the validity of CAPM is probably just as true today : ".....but it is ironic that after more than a decade of study, no robust test of a supposedly testable theory exists." The next paper to be discussed shows that three years later, the situation had remained much the same.

FOGLER, JOHN & TIPTON (1981) The aim of the authors of this paper was to : ".....uncover factors other than the market factor which may provide additional explanation of stock return.". They used both the OLS method as well as computerised factor analyses to indentify the major factors involved. The data used were derived from CRSP tapes. The sample was 100 stocks divided into eight industrial groupings for the period 1959 to 1977. The multiple regression was based upon the following expression: \_

$$r_{it} = \hat{B}_0 + \hat{B}_1 x_{1t} + \hat{B}_2 x_{2t} + \hat{B}_3 x_{3t} + e_{it}$$

where:  $r_{it}$  = Excess return on stock i for period t  
 $x_{1t}$  = Excess return for CRSP weighted index for period t  
 $x_{2t}$  = Excess return on three months US T-Bills for period t  
 $x_{3t}$  = Excess return on Aa utility bond for period t

The result of the study showed that whilst the estimated coefficient on market return was significant, all the other coefficients were

not. The authors concluded thus, " This probably explains part of the reason for the wide acceptance of CAPM.".

The computerised factor analyses using the same body of data provided roughly similar results which is shown in part below:-

PRINCIPLE COMPONENT	PROPORTION OF EXCESS RETURN EXPLAINED
---------------------	---------------------------------------

1	35.3%
2	4.8%
3	4.2%
4	3.9%
5	2.0%
6	1.9%

Apart from the first component, which is almost certainly due to market effect, the effect of the other components appear to be small. The authors believed that the second component was largely caused by T-Bill rate while the third component could not be shown to be related to the Aa utility bond rate except during parts of the study period.

The authors did not come to any specific conclusion at the end of this paper beyond saying that the economic factors studied appeared to have some effect on stock return. They felt that more investigations were required before attempting to answer several unanswered questions posed at the end of the paper. In particular, they questioned whether the relationship between ex post return and ex post economic factors actually indicated ex ante relationship.

As things now stand, CAPM/MM is still the preferred model of stock behavior, at least until something better comes along. For this thesis, it shall be assumed that the adjustment made to stock return using the Market Model is the best way to obtain normalised return.



## CHAPTER SIX - PART I

### DEVELOPMENT OF THE DATABASE

#### 6.1 - Introduction

Chapter Six is divided into two parts: (1) A description of the design features of the database and how it is developed and (2) A description of how and why the more important initial outputs from the raw database are derived.

##### Part I

6.2 - Selection of Data to be included in the Database

6.3 - Selection of the Sample Stocks

6.4 - Sources of Data and Methods of Data Gathering

##### Part II

6.5 - Computation of the different Capitalisation Multipliers

6.6 - Derivation of various categories of Stock Return

6.7 - Computation of different types of Beta and the selection of the of Beta to be used

#### 6.2 - Composition of the Database

##### 6.2.1 - CRITERIA FOR SELECTING DATA FOR INCLUSION IN THE DATABASE

Universally, it is accepted that stockmarket research requires a very large amount of data because of the size of the population, the rapidity of change in the variables involved and the many fields of information involved. It is commonly acknowledged that there was little significant stockmarket research until the Sixties because of the lack of high speed computers and large computerised databases. The importance of databases such as the CRSP in the US and LSPD in Britain is obvious given the very large proportion of stockmarket research in the respective country which is based on these two databases.

Unlike researchers in the West, it is not possible for this researcher to draw on information stored in existing databases. Malaysia can be said to be a completely green field in so far as stockmarket research is concerned. There has been no published research of any standing from Malaysia. Even in Singapore, which is more advanced, the amount of high level research conducted is very limited. It was not until 1981 that the National University of Singapore started to create a computerised stockmarket information system. Even so, the timespan of the data being collected is short (since 1973) and the work is as yet incomplete. In any case, owing to the non-parity of Singaporean and Malaysian currencies and increasingly different listed companies (about 70% of the pupulation of the two market are the same), whatever data held in the aforementioned database would be incomplete and in addition cannot be directly used for this study. In addition there are doubts about the accuracy of the data in this particular database.

For these reasons therefore, a completely new database has to be created for the Malaysian situation. The size and range of data to be held in this database are dependent on the following criteria:-

- (1) The nature and direction of the intended research;
- (2) Its comparability with existing databases;
- (3) The relatively smaller size and shorter history of the Malaysian stock market;
- (4) The resources available and the ready accessibility of the required information; and
- (5) Differences in the nature of the listed stocks.

Each of these selection criteria will be discussed in detail next.

**THE NATURE AND DIRECTION OF RESEARCH** As explained in Chapter One and as will be further amplified in Chapter Seven and Eight, the main thrust of the research for this dissertation will be to replicate wellknown Western efficiency tests under Malaysian conditions. Since these tests are largely based on the aforementioned databases, the proposed database ought to replicate the data structure of its predecessor databases.

**COMPARABILITY WITH EXISTING DATABASES** There are two important reasons for choosing to design a database which is comparable with

the existing databases. The first reason is the one given in the previous paragraph. The second reason is that it is only right that one should reap the benefit of the greater experience of the Western researchers. A lot of thinking and trial and errors had probably gone into the design of these databases; it is only right that a new database should be based on their design unless there are very compelling reasons for not doing so.

As previously mentioned, the two best known stockmarket databases are the CRSP and LSPD, the latter being developed from the former (Smithers (1980)). Given the similarity between the British and Malaysian accounting and stock trading systems, it is therefore decided to closely follow the design of the LSPD database. There are inevitably some differences owing to the different characteristics of each market. The similarities and differences between the two databases will be described in detail under Subsection 6.2.2.

**THE RELATIVELY SMALL SIZE AND YOUTH OF THE MALAYSIAN MARKET** The Malaysian market had an official existence of only 25 years and the number of shares listed is less than one twentieth of that listed in the New York or London Stock Exchange. It would not be possible to duplicate the CRSP or LSPD in terms of years of record or the number of stocks included.

**AVAILABLE RESOURCES AND ACCESSIBILITY OF EXISTING INFORMATION SOURCES** Both the CRSP and LSPD were funded by members of the securities industry. Their size and coverage is only possible given this level of funding. The present database had to be built up within the context of a doctoral programme without external funding apart from the free use of computer facilities of the Science Univesity of Malaysia. While it is not possible to know how much difficulty the creators of the predecessor databases went through in gathering their data, the present task requires a considerably greater amount of effort than otherwise owing to the lack of proper archival facilities. In the first 13 years of its life, the KLSE went through three different incarnations and two removals, the archive stores are therefore incomplete and disorganised. Apart from this, the record keeping and organisation of the earlier years left much to be desired. (This is only to be expected given the lack of experience of the organisations involved.) Given the relative paucity of resources, economy can be achieved by either limiting the amount of data gathered per stock or by limiting the size of the sample. Given the

requirements of (1) and (2) above, it is decided to have as complete a record of each of the sampled stocks as possible while limiting the number of stocks in the sample.

In term of information to be included, the available information covers much the same range as that covered by LSPD with one major difference--the non-availability of Alpha and Beta for each of the stock.

THE DIFFERENCES IN THE NATURE OF THE LISTED COMPANIES In many ways, the Malaysian listed companies are considerably simpler than their British counterparts. This is partly due to history and partly due to the laws and regulations in force. The amount of descriptive information provided by LSPD is large to take into account the very complex corporate structure that is possible in Britain. Given the simpler corporate structure of Malaysian companies, the whole of the descriptive data file under LSPD can be dropped as much of the data included is not applicable and the few remaining classes of information can be included in the other files.

#### 6.2.2 - COMPARISON BETWEEN LSPD AND THE PRESENT DATABASE

##### (A) THE MAIN DESIGN FEATURES

The major design features of the LSPD are provided on the left hand side of Table 6.1 below with the design features of the present database provided on the right hand side.

As can be seen from Table 6.1, there are only three main differences between the two databases in terms of major features --sampling method, periodicity and inclusion of volume data.

The reason for choosing this particular sampling method will be explained in Section 6.3. The reason for using weekly rather than monthly sampling interval is that the modern trend seems to be towards a shorter interval (witness the fact that the latest CRSP tape provides daily sampling interval for prices). A shorter sampling interval, however, introduces the problem of infrequent trading for certain stocks. This problem will be examined in Section 6.6. The reason for including the volume data being that in terms of resources, it does not take much to include volume data as it is obtained from

**TABLE 6.1**  
**MAIN FEATURES OF LSPD AND THE MALAYSIAN DATABASE**

LSPD	MALAYSIAN DATABASE
(1) Initial Time Coverage	
1955-1975	1968-1983
(2) Basis for selecting Sample	
Three Overlapping Samples	Two Overlapping Samples
(a) Random sample covering 33% of the population	(a) The 50 largest companies at the beginning of 1968
(b) The 500 largest firms of 1955 (8.3% of the population)	(b) The 60 largest companies at the end of 1982
(c) The 200 largest firms of 1974 (3.3% of the population)	(Section 6.3 will provide explanation for the sampling method)
(3) Sample Size	
2300 firms covering about 40% of the listed firms and about 80% in term of market value	55-77 firms covering 30% to 50% of the listed firms and about 67% to 89% in term of market value
(4) Periodicity	
Monthly for price data and others as per occurrence	Weekly for transaction data and others as per occurrence
(5) Data Types Included	
Seven classes of data	Five classes of data
(a) Descriptive data	(a) Price ) Transaction Data
(b) Capital changes	(b) Volume )
(c) Dividend	(c) Capitalisation Changes
(d) Par values	(d) Dividend
(e) Price	(e) Earnings
(f) Share capitals	
(g) Earnings per share	

the same sources as price data. The main manpower requirement being recording and keypunching which can be carried out by assistants. Although the collected volume data is not being utilised in this project, it is hoped that future researchers will be able to make use of it.

## (B) DATA INCLUDED

This section will examine in detail the types of data included in the two respective databases. The contents of LSPD and the Malaysian database are shown side by side in Table 6.2. For the sake of brevity, in future text, the proposed database will be known as MSMD (for Malaysian Stock Market Database). Explanatory notes on the reasons for the differences between the contents included are provided in Section 6.3.

## 6.3 - Sampling Method

### 6.3.1 -IMPORTANT DIFFERENCES IN SAMPLE DESIGN CONSIDERATIONS

**PURPOSE BEHIND DEVELOPMENT OF DATABASE** Before drawing up the method of selecting the member stocks for the Malaysian Stock Market Database (MSMD for short), it is important first to consider the main intentions behind the development of this database. There are some differences in the requirements of MSMD compared with LSPD. LSPD was probably designed "purely" as a database. That is, Smithers, who designed it, presumably did not have in mind what he himself wanted to do with the data after the database was completed. The LSPD was developed for use by other researchers. In contrast, the prime purpose of the MSMD is to support the research undertaken for the completion of this dissertation. The researchers who intend to make use of LSPD would usually further select a sample of stocks from the larger sample within the database. Each researcher presumably adopts a sample selection method which best suits his purpose. It is quite clear that one would not expect many research projects to make full use of all of the 2300 stocks within the LSPD. In contrast, the MSMD is designed first and foremost to provide data for the tests to be carried out in support of the hypothesis put forward in this dissertation. Its prime purpose is therefore to provide an adequate number (a minimum of 30) of representative subjects for each of the 7



TABLE 6.2  
CONTENTS OF LSPD AND MALAYSIAN DATABASE

LSPD	MALAYSIAN DATABASE
<hr/>	
(1) Descriptive Data	
-Code no., no. of capital changes, no. of dividend, no. of par value changes	-Not included, data available from other files and records
-Dates of birth and death and of first quotation	-Not included
-Sample membership	-Not included
-Cross reference with SEDOL and Extel	-Not applicable
-New and previous accounting dates	-Available from Dividend File
-Name changes	-Available from record
-Dates of major changes in nature of business	-Not included
-Estimate of Beta	-Not available in raw form
-Number of missing prices	-Not applicable
<hr/>	
(2) Capital Changes	
-Ex dates	-Included
-Adjustment factors	-Included
-Capital Change type	-Included
-Type of shares involved	-Included
-Dividend Ranking Date	-Included
-Announcement date	-Included
-Six different markers to indicate ratio of new shares to old, premium, cum price etc	-Different marking system
<hr/>	
(3) Dividend	
-Announcement date	-Included
-Ex date	-Included
-Payment date	-Included
-Marker to indicate special status	-Included
-Year of dividend	-Included
-Type of dividend	-Included
-Tax rate	-Included
-Not included	-Denominating currency
<hr/>	

TABLE 6.2 (CONTD 1)  
 CONTENTS OF LSPD AND THE MALAYSIAN DATABASE

<p>(4) Par Value</p> <p>-Date of change          -Type of shares          -New Par Value</p>	<p>-Included in Capital.Changes file          -Not applicable          -Included in Capital.Changes file</p>
<p>(5) Prices</p> <p>-End of month date          -Low and high quotes          -Transaction Price</p> <p>-Transaction date          -Price marker</p>	<p>-End of week date          -Not included          -Included, mid quotes price provided if no transaction, last transacted price provided if no mid quotes price available          -Not included          -Not included</p>
<p>(6) Share Capital</p> <p>-Year of Change          -Share capital</p>	<p>-Included in Capital Changes file          -Included in Capital Changes file          -No. of shares also provided</p>
<p>(7) Earnings Per Share</p> <p>-Year          -Actual EPS          -Adjusted EPS</p>	<p>) Listed firms only recently started to provide EPS figures. Previously EPS had to be computed by users.</p> <p>A separate Earnings file will be constructed on similar line to the Dividend file and contains the following raw data</p> <p>-Announcement date          -Financial Year          -Half year and full year Earnings before Tax          -Full year after tax earnings          -Adjusted 12 month eps before tax</p>
<p>(8) Volume</p> <p>-Not Included</p>	<p>Included on the same basis as Price</p>

efficiency tests to be carried out so that some generalised statements can be made about the Malaysian market.

THE SIZE DISTRIBUTION OF THE LISTED FIRMS Judging by the information provided in Smither (1980), the size distribution of firms on the LSE is heavily skewed towards the top end. Out of a total population of nearly 6000 firms, a sample that is based approximately on the largest 10%(approximately) of the population plus another 33% randomly selected make up 80% of the total market value of the listed firms. In contrast, the largest 30% of the firms listed on the KLSE make up only just over 60% of the total market value. A simulation of Smithers' sample selection method was carried out on the Malaysian stock population and the result of the simulation reveals that the coverage in terms of market value would be much poorer. The largest 10% (25) of the population plus a further 33% of the population in the form of a randomly selected sample produces a coverage of 63% at the beginning of 1983. This contrasts with a coverage of 75% at the same date using the sampling method selected. Furthermore, Smithers' selection method applied locally produces a far greater concentration in certain sectors of the market. Thus the 25 largest companies alone make up 45% of the total market value of the population. Of the 45%, 25% is accounted by a mere 9 companies from the Finance and Plantations sectors.

THE NECESSITY OF HAVING A MARKET PORTFOLIO AS A SUBSET OF THE MAIN DATABASE As mentioned earlier, the Beta for individual stocks on the KLSE is not available. One of the first tasks of the project is therefore to compute the beta of each stock in the database by regressing its return against the market return. As a surrogate for the actual market, a "market portfolio" has to be created. The requirements of the stocks which go into the market portfolio are not the same as stocks selected for the database. The market portfolio has to track the performance of the market as a whole as closely as possible. While the database is to provide a sample which permits generalisation on the market behavior over a fairly long period of time. Given the continually changing nature of the stockmarket, the database portfolio which is formed from samples selected at the beginning and end of the research period is probably not capable of tracking closely the return on the market throughout the whole of the research period.

For this reason a separate market portfolio is created based on the

largest 40 firms by market value, rebalanced on a yearly basis with stratification by sectors. Several firms ( which may be termed "shooting star" stocks given the meteoric rise and fall of their market value.) selected on this basis are not part of the original database portfolio and they have to be added in subsequently.

Compared with the typical market portfolio of the West, a portfolio of 40 is very small. However, the work of Lorie and Hamilton (1971) has shown that a sample as small as 8 can provide a reasonable representation of the market. In fact, their work also shows that there is little precision to be gained in increasing the sample much beyond 30. As will be shown later, it is possible to select an annual market portfolio of 40 stocks which give an excellent facsimile of the market segmentation by market value. It is likely that such a portfolio would provide a good surrogate of the market in terms of return. A market portfolio of 40 would therefore appear to be adequate.

**TIMESPAN OF THE DATABASE** There are several conflicting requirements in choosing the timespan of the stockmarket; the three more important ones are:-

- (1) The stability of the characteristics being tested;
- (2) The resources required for going further back in time; and
- (3) The need to have as many data points as possible to improve the power of the tests.

Given the fact that the market is so new, its characteristics are probably changing quite rapidly. It is possible that over the 25 year lifespan of the market, it may have changed a great deal such that the same conclusion cannot be drawn over the whole timespan. The cost of search of data increases disproportionately as one goes back in time given the Malaysian conditions. In the earlier years of the stock market's existence, record keeping and reporting was very poor. Given these conflicting requirements, it is thought that a research period of 16 years represents a reasonable compromise between them, until more resources become available. To allow for the possibility that the market may be evolving, some of the tests to be conducted will be performed on subsets of the data divided in accordance with time periods. As will be shown later in this thesis, market behavior is not consistent even over this short span of time.

### 6.3.2 - SAMPLE SELECTION ISSUES AND METHOD

#### (A) SAMPLE DESIGN ISSUES

The sample selected to go into the MSMD is based on the following criteria, the reasons for adopting these particular criteria will be discussed in the next section of the text:-

- (1) Sample firms selected based on market value rather than on a random basis;
- (2) Sample firms are stratified by business sectors;
- (3) Other things being equal, a more frequently traded stock is selected over a less frequently traded one; and
- (4) The population from which the samples are drawn is made up of all stocks listed on the KLSE or its predecessors regardless of its official country of domicile or the number of other exchanges on which it is listed.

(1) **SELECTION BASED ON NON-RANDOM SAMPLE** The firms selected for the database are based on two overlapping samples of the 50 largest firms in 1967 and the 60 largest firms in 1982. The firms selected for the annual market portfolio are based on the 40 largest firms at the beginning of each year. All samples are stratified by sectors according to market value weights. There are several reasons for using a non-random selection method in building the market portfolio and the database.

Firstly, there is the consideration of what is to be regarded as the basic unit of the population to be sampled. There are three possible candidates -- the firms themselves, the total number of outstanding shares and the total dollar market value of the shares. If one is studying the behavior of the management or some other sociological behavior which is dependent on the firm as a complete entity, the firms themselves would be the obvious unit of survey. However, since this dissertation is examining the behavior of the individual shares (more especially the behavior of its return), it would be logical to consider the last as being the basic unit of the population under study. This conclusion is in line with the convention of stockmarket research. Since the cost of data gathering is the same irrespective of the size of the firm (in fact it is, on average, slightly cheaper for the larger firms), from the practical viewpoint, it is better to

use a non-random selection method based on size. The chosen sampling method results in a 30% sample (at the end of the research period) which covers over 70% of the total market value of the population. To achieve the same coverage of the population, a random selection method would require more than twice as many firms.

Secondly, it is normal for the smaller firms to be traded less frequently than the larger firms. Infrequent trading would bring with it the problems of inaccuracy in computed return and beta. Although this problem can be overcome to a certain extent by using methods such as Dimson's (1979), it is obviously preferable to use the more frequently traded stocks in the first place. This is especially true in Malaysia where the larger firms dominate the trading. As will be shown later, the problem of non-trading is already quite acute for some of the firms under the present selection method. A method based on random selection would aggravate this problem. Judging from work in the West, there are indications that the behavior of the smaller firms' stocks is often at variant with that of the market as a whole owing to the lack of interest on the part of the investors (e.g. the small firm effect). A sample that is heavily weighted with the smaller firms can produce biased results in the tests conducted.

It is therefore thought that a size based sample would produce greater precision in the results than a randomly selected one. It is possible that some biases may be introduced by this method of selection. A likely bias is to favour some of the sectors which are made up of large firms. This bias can be overcome by using stratified sample. Other biases, if they exist, would probably be similar to biases uncovered in the West. They are therefore known and can be allowed for in drawing conclusions from the tests. In order to reduce other possible biases, two overlapping samples are taken rather than one.

**STRATIFICATION BY MARKET SECTORS** The listed firms are separated into seven different sectors by the KLSE -- Industrial and Commercial, Finance, Hotels, Properties, Oil Palm, Rubber and Tin. Two of these sectors, Hotels and Oil Palm, are very small and for the purpose of this project can be respectively merged into the Properties and Rubber sectors since they are broadly similar in nature. Prior investigations reveal that firms in the various sectors can differ considerably along various dimensions. In particular, they can be very different in terms of age of firms, size, growth rate,



return and trading frequency.

Firms are therefore selected for both the market portfolio and the database sector by sector, the stratification factor being the market value of each sector. That is, the market value of each sector is computed and the largest firms from within each sector are included so as to give the each sector within the sample the same weight as the sector within the actual market. As a result of stratification, the numerical representation of each sector can be very different from the market value weights. For example, the finance sector is often represented by only 2 or 3 firms (about 1% or 1.5% in terms of firms in the number in the sample) but they often represent 20% or more in terms of market value.

**INFREQUENT TRADING** As explained above, infrequent trading can create problems of inaccuracy. Ideally, only the regularly traded stocks should be included in the two samples, especially the market portfolio. There are several problems in applying this criterion to this project. Firstly, there is the problem of defining what is meant by "infrequent trading" --there is no commonly accepted definition of this term. This is perhaps not a serious problem because commonsense can be applied to overcome it. For this project, a stock is said to be "infrequently traded" if, during any one year, there is one or more four week period during which there is no price change. A stock is further said to be "very infrequently traded" if, in any one year, there is one or more thirteen week period during which there is no price change. Although the criteria are fairly arbitrary apart from being associated with the nodal periods of one month and one quarter, there is some logic behind them. Using Dimsom's AC method (1979), it is practically feasible to adjust the beta computation for the first category of infrequent trading by including the return for 5 leading and lagging weeks in the regression equation. It is therefore acceptable to include stocks of the first but less so the second.

However, it is not possible to apply this criterion throughout during the selection process. The problem is that two of the sectors, Hotels and Properties and Tin suffer from the twin problems of infrequent trading as well as being composed of firms of small and fairly uniform size. This means that a relatively large number of firms have to be included, many of which suffer from infrequent trading. These problems were particularly acute during the "non-boom" years during the earlier part of the research period. (During the "boom"

years, most shares are regularly traded). If the criterion of frequent trading were to be applied rigidly, these two sectors would become very under-represented during certain parts of the research period. This criterion can therefore be applied only to the selection of the other three sectors. (Post 1977, the Tin sector became dominated by a single giant firm which shares were and still are regularly traded. Infrequent trading is therefore largely a problem confined to the Hotels and Properties sector.)

**DEFINING THE POPULATION UNIVERSE** Owing to the close historical ties between the UK, Singapore and Malaysia, a very large proportion of the firms listed on the KLSE are actually non Malaysian resident companies. There are three main types of companies which, although not domiciled in Malaysia, are listed on its stock exchange:-

(1) British plantations and tin companies which business was located in Malaysia. Although most of these companies were listed on the London Exchange, they were also colisted on the KLSE. Their shares were traded in Malaysia using the local currency unit as if they were local companies. The domicile of most companies in this category was gradually shifted during the Seventies such that at the end of the research period, all but one of the sampled firms previously domiciled in Britain have shifted their official residence to Malaysia.

(2) Trading and Finance Companies with business throughout Malaysia and Singapore but are resident in Singapore. This category has become much smaller since the start of the research period. Many of these companies have split their operation into two and relisted their components separately on KLSE and SES. The relisting is usually achieved by issuing two classes of shares to the original shareholders. Whenever this took place, the previously joined company was replaced by its Malaysian component in the sample. Those companies which have not yet split, of which there are 10 in number at the end of the research period, are all regularly traded on KLSE.

(3) Singapore based Hotels and Properties companies which have no business interest in Malaysia. This is a problematic category because, in addition, several of these are not frequently traded in the first place. There are 9 companies in this category among the 13 companies selected to represent this business sector. If these nine are excluded, it will result in the whole sector being very much

underrepresented in the sample for there were very few Malaysian domiciled companies in this sector for much of the research period. This is an important sector since the sector weight varies from 5% to 14% during the research period. (The very high variability is caused by the very high beta of companies in this sector.)

THE COMPANIES TO BE INCLUDED IN THE POPULATION UNIVERSE A decision therefore has to be made to either exclude or include these three categories of companies as part of the universe from which to choose the sample. There are little difficulties in deciding that the first of the above three categories should be included.

There are compelling reasons for including the second as well. Firstly, for 6 out of the 16 years of the research period, the Singapore and Malaysian exchanges were one and they are still very closely linked with close arbitraging actions between the two. Secondly there is an active market for these stocks in Malaysia throughout the research period. Third, many of the companies have split their operations into two following the separation of the two exchanges; if the predecessor companies are not included, the Malaysian components will have to be included after the split in any case.

The third category is the most problematic. If those companies which have no business interest in Malaysia were to be excluded from the Hotels and Properties sector, this sector would become very underrepresented during the time when the two exchanges were one. In the end, it was decided to base the decision of whether to include them or not upon the volume of transaction in these stocks at the KLSE as a percentage of the total transaction volume of the two exchanges. If the percentage of transaction undertaken at the KLSE is reasonably high, these stocks are to be included as part of the population universe. Table 6.3 below provides this piece of information from post separation to the end of the research period.

TABLE 6.3

KLSE TRANSACTION VOLUME AS PERCENTAGE OF  
TOTAL VOLUME IN KLSE/SES IN RESPECT OF  
STOCKS IN THE HOTELS AND PROPERTIES SECTOR

	HOTELS		PROPERTIES		TOTAL	
	VOL \$'000	KLSE %	VOL \$'000	KLSE %	VOL \$'000	KLSE %
1974	123,460	39.5	158,439	44.9	281,899	42.5
1975	172,127	31.6	177,039	40.3	349,166	36.0
1976	67,296	22.3	130,244	18.0	197,540	19.5
1977	32,533	1.4	113,244	33.6	146,315	26.4
1978	215,546	24.0	346,483	37.6	562,029	32.3
1979	115,284	22.3	209,668	24.1	324,952	23.4
1980	346,632	20.5	1,322,472	22.1	1,669,104	21.8
1981	1,157,583	14.8	2,176,540	27.0	3,334,123	22.7
1982	290,439	16.6	822,960	25.1	1,113,395	22.9
1983	668,365	23.1	1,787,351	42.2	2,455,716	37.0

From this table, it can be seen that apart from 1976, the part played by KLSE in the total picture is above 20% and in four of these years, it played a greater than 30% part. It would thus appear that it is preferable to include them as part of the population from which to select the sample.

It is therefore decided that as long as a firm is listed on the KLSE, and there is a market for it, it should be included in the population from which the samples are to be drawn.

#### (B) SAMPLE SELECTION PROCEDURE

The samples are selected based on the above stated principles on a trial and error basis. The market value of each of the listed companies (except for those with a market value of below M\$5 million which are not likely to be chosen) are fed into an IBM Micro Computer year by year. A standard financial spreadsheet programme (Visicalc) is used to work out the best combination of stocks for the beginning and ending years for the database and for each of the years for the market portfolio. The method is purely by trials and errors until a combination of 40, 50 or 60 stocks could be found such that each

sector of the sample is as closely matched as possible to the actual sector weight for that particular year. Various combinations are tried until the variances of the sample weights from the actual weights are at a minimum. Certain simplifying steps are taken to shorten the process of selection:-

- (1) Balance between the various sectors take precedence over sticking to the rule of inclusion of the largest firms;
- (2) Infrequently traded stocks(as previously defined) are not considered unless there are no other choices;
- (3) Stocks listed for five years or less are not considered;
- (4) The Industrial and Commercial sector firms are used for "fine tuning" the samples after the other sectors are largely fixed. This is done because the large population and range of market values available in this sector make the task of balancing the portfolio very much simpler.

The numerical and percentage of market value representation by sector for both the database sample and the market portfolio of each of the years of the research period are provided in Tables 6.4 and 6.5. shown below.

### 6.3.3 - POINTS OF NOTE FROM TABLES 6.4 AND 6.5

#### (A) DISCUSSION ON THE DATABASE SAMPLE - TABLE 6.4

A very obvious characteristic of the market is the slow down in the growth of the listed companies, the reason for which has been previously explained in Chapter Two. After 1975, there has been hardly any growth at all. In particular, the years from 1975 to 1982 only saw an increase of 4. As a result of this slow down in growth, the database sample, though small in number, remains a very good representation of the overall market throughout. Although the percentage representation fluctuates, the sample still gives a 75% representation in 1982.

A second important point to note is the large fluctuation in the percentage representation of the database sample within the market. Part of the explanation for this large fluctuation is the high beta of the blue chips which are heavily represented in the database sample. During the "bull runs", blue chips have a tendency to be bid up to a very high level. Thus during the last three booms -

TABLE 6.4(A)

ANNUAL NUMERICAL REPRESENTATION BY SECTOR  
- DATABASE SAMPLE

	TOTAL		INDUSTRIAL		FINANCE		HOTELS & PROP		PLANTATIONS		TIN	
	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE
1968	115	55	52	31	10	4	13	11	28	5	11	4
1969	141	59	65	33	10	4	22	12	30	5	14	5
1970	185	60	93	35	14	4	28	11	32	5	18	5
1971	203	67	109	38	15	5	28	13	32	6	19	5
1972	215	69	116	40	15	5	30	13	32	6	22	5
1973	224	74	121	41	14	5	29	13	33	9	27	6
1974	229	74	129	41	12	5	30	13	29	9	29	6
1975	248	76	136	42	11	5	28	13	44	10	29	6
1976	249	77	136	42	12	5	28	13	44	10	30	7
1977	254	75	141	41	13	5	25	13	44	9	31	7
1978	251	76	137	41	14	5	25	13	41	9	34	8
1979	252	76	141	41	14	5	23	13	40	9	34	8
1980	252	76	142	41	14	5	22	13	41	9	33	8
1981	249	76	142	41	16	5	21	13	41	9	29	8
1982	252	75	143	40	16	5	23	13	41	8	29	8
1983	261	74	149	40	16	5	25	13	42	8	29	8



TABLE 6.4(B)

ANNUAL PERCENTAGE REPRESENTATION BY SECTOR  
- DATABASE SAMPLE

	TOTAL AS % OF MARKET	INDUSTRIAL		FINANCE		HOTELS & PROP.		PLANATIONS		TIN	
		ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE
1968	89.2	73.2	69.1	9.3	12.3	6.7	8.1	5.6	6.0	5.2	4.5
1969	75.7	69.7	70.0	10.2	11.1	9.0	7.4	4.4	4.0	6.7	7.5
1970	70.4	68.3	68.7	11.2	12.5	7.4	5.8	6.4	6.1	6.6	7.0
1971	68.6	66.1	66.8	11.8	13.2	8.2	5.6	7.4	7.1	6.4	7.3
1972	73.1	66.9	68.0	14.5	16.0	6.0	4.1	6.9	6.5	5.7	5.4
1973	73.8	51.5	42.8	25.1	29.7	11.7	8.3	8.1	9.3	3.8	2.9
1974	69.7	48.8	50.6	16.9	20.6	11.2	8.4	18.4	17.3	4.7	3.1
1975	67.4	48.0	49.8	13.8	17.4	11.4	7.3	19.7	18.7	7.1	6.8
1976	72.9	49.1	51.2	19.7	24.5	9.0	5.9	17.0	14.7	5.0	3.8
1977	71.4	49.7	50.4	20.9	26.6	8.4	5.9	16.6	13.4	4.4	3.7
1978	74.2	50.8	50.5	16.7	20.2	7.8	5.3	17.5	17.7	7.2	6.5
1979	74.4	52.1	50.6	16.4	19.6	7.4	5.9	18.5	19.0	5.7	4.9
1980	73.8	51.9	49.8	14.6	17.4	7.3	6.5	20.6	21.2	5.6	5.1
1981	79.7	49.4	50.1	19.0	20.4	9.4	9.1	15.2	14.2	7.0	6.2
1982	74.9	48.0	45.9	20.7	22.6	13.6	13.6	11.8	11.9	5.9	6.1
1983	68.5	48.5	48.4	20.8	24.9	12.8	12.0	13.2	11.5	4.2	4.2

TABLE 6.5(A)

ANNUAL NUMERICAL REPRESENTATION BY SECTOR  
- MARKET PORTFOLIO

	TOTAL		INDUSTRIAL		FINANCE		HOTELS & PROP		PLANTATIONS		TIN	
	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE
1968	115	40	52	23	10	3	13	7	28	4	11	3
1969	141	40	65	20	10	2	22	11	30	4	14	3
1970	185	40	93	21	14	2	28	11	32	4	18	3
1971	203	40	109	20	15	2	28	11	32	3	19	3
1972	215	40	116	19	15	3	30	11	32	4	22	3
1973	224	40	121	16	14	2	29	12	33	5	27	5
1974	229	40	129	17	12	2	30	11	29	5	29	5
1975	248	40	136	17	11	3	28	12	44	6	29	2
1976	249	40	136	16	12	2	28	11	44	6	30	5
1977	254	40	141	17	13	2	25	10	44	6	31	5
1978	251	40	137	17	14	2	25	11	41	5	34	5
1979	252	40	141	18	14	2	23	10	40	5	34	5
1980	252	40	142	20	14	3	22	7	41	5	33	5
1981	249	40	142	19	16	3	21	7	41	6	29	5
1982	252	40	143	22	16	3	23	7	41	6	29	2
1983	261	40	149	22	16	2	25	8	42	6	29	2

TABLE 6.5(B)

ANNUAL PERCENTAGE REPRESENTATION BY SECTOR  
- MARKET PORTFOLIO

	TOTAL AS % OF MARKET	INDUSTRIAL		FINANCE		HOTELS & PROP.		PLANATIONS		TIN	
		ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE	ACTUAL	SAMPLE
1968	71.4	73.2	71.7	9.3	9.4	6.7	6.8	5.6	4.6	5.2	5.2
1969	64.5	69.7	69.6	10.2	11.4	9.0	8.3	4.4	4.3	6.7	6.3
1970	59.3	68.3	67.2	11.2	13.5	7.4	6.5	6.4	6.5	6.6	6.4
1971	56.0	66.1	66.8	11.8	12.9	8.2	6.2	7.4	7.2	6.4	6.9
1972	57.4	66.9	68.4	14.5	15.0	6.0	4.9	6.9	6.2	5.7	5.5
1973	51.7	51.5	52.0	25.1	24.2	11.7	11.2	8.1	8.7	3.8	3.9
1974	54.8	48.8	49.5	16.9	17.3	11.2	11.1	18.4	18.4	4.7	3.7
1975	46.1	48.0	48.8	13.8	13.6	11.4	10.8	19.7	19.1	7.1	7.7
1976	49.8	49.1	49.8	19.7	19.7	9.0	8.7	17.0	17.2	5.0	4.5
1977	50.1	49.7	50.4	20.9	19.8	8.4	8.3	16.6	16.9	4.4	4.5
1978	53.6	50.8	51.1	16.7	16.8	7.8	7.0	17.5	17.8	7.2	7.2
1979	56.9	52.1	52.5	16.4	16.4	7.4	7.2	18.5	18.6	5.7	5.2
1980	55.7	51.9	51.4	14.6	15.1	7.3	7.0	20.6	21.1	5.6	5.4
1981	61.5	49.4	48.4	19.0	19.8	9.4	9.7	15.2	15.1	7.0	7.0
1982	52.6	48.0	48.0	20.7	20.6	13.6	13.1	11.8	12.0	5.9	6.2
1983	49.7	48.5	48.6	20.8	20.9	12.8	12.7	13.2	13.6	4.2	4.1

1968, 1972/3 and 1979/81 - the database sample assumes a much larger part in the overall market value. But a year later, their representation can drop by as much as 5%. It is interesting to note this peculiar behavior of the local market compared with the West where the blue chips are usually accorded lower beta.

The third point to note is that in spite of the lack of sophistication in the sample selection method, the database sample provides a reasonably accurate representation of the market in terms of sector weights. In spite of the large relative changes in importance of the various sectors, the database sample has managed to keep track of these changes. Apart from the fact that the Finance sector has a tendency to be over-represented, the database provides a reasonable facsimile of the overall market.

#### B) DISCUSSION ON THE ANNUAL MARKET PORTFOLIOS - TABLE 6.5

The first important point to note is that under the Malaysian conditions, a 40 company portfolio can provide a very good representation for the overall market. For all but two years of the research period, the chosen market portfolio represented 50% or greater of the market in terms of market value. Second, it is noteworthy that using a yearly rebalancing, it is possible to track the market very accurately in terms of sector weights.

### 6.4 - Sources of Data and Methods of Data Collection

#### 6.4.1 - TYPES OF DATA REQUIRED FOR THE RESEARCH

As outlined in Section 6.2, the MSMD will be made up of five types of data, viz.: Price, Volume, Capitalisation, Dividend and Earnings. These five types of data can be grouped into two major categories:-

- (1) Transaction Data - Price and Volume; and
- (2) Accounting Data - Capitalisation, Dividend and Earnings.

These two categories of data are very different in their nature. They come from very different sources and require different collection

methods.

**TRANSACTION DATA** This type of data can be characterised by its bulk and the simplicity of its collection. The required data can be copied directly from their sources onto coding sheets and later be keyed onto computer tape directly. The raw data as such is therefore immediately usable without any further processing. This type of data is also very voluminous as it is sampled on a weekly basis for the whole of the research period or 832 data points for each of the sampled companies (78).

**ACCOUNTING DATA** This category of data is very different from the first. Firstly, the information as collected requires to be further processed before they are usable for further computer processing. For example, a collection of raw data on the history of bonus issues of a company has to be converted into a list of capitalisation adjustment factors before they can be used. Secondly, this type of data has very complex structure. For example, a single capitalisation change of a company involves as many as 10 pieces (sometimes more) of information which have to be culled from different sources. Thirdly, the absolute volume of data involved is small for each of the three subclasses of data in this category. There are usually only 32 lines of data on dividend or earnings and about half as many in respect of capitalisation changes. From a data handling point of view, it is more advantages to collect and process the information manually upto the point where it is feasible to use computerised processing.

Given the very different nature of these two different categories of data, discussion in the remainder of this section will be divided accordingly.

#### 6.4.2 - SOURCES OF INFORMATION AND THEIR RELATIONSHIP TO EACH TYPE OF DATA

##### (A) NEWSPAPERS

Newspapers, being a daily publication, are the only sources of transaction information until recently when the Singapore Stock Exchange (SES) computerised their transactions handling operations. As far as the research period is concerned, they are the sole sources. Of the newspapers published locally, two could be used as

sources of information for this project. They are the New Straits Times (and its predecessor, the Straits Times) and the Business Times. Unfortunately, the latter did not start publication until 1975 and the range of information provided was very inadequate for a supposedly business oriented paper. Though it has been improving gradually over the years, it is only in the last few years that the coverage can be regarded as adequate. For example, it is only in the last three years of the research period that it had been providing a complete weekly report on the dividend, earnings and capitalisation announcements of the listed companies. As a result, this newspaper is not used as a primary source of this category of information.

The most important part played by the New Straits Times as a source of information is in its providing the so-called "Weekly Share Market Report". This column has been a regular weekly feature of the New Straits Times since 1969 and before that, there was a less complete report. This report provides the last traded price, the highest and lowest prices for the calendar year to date, the trading volume, the dividend yield and the price earnings ratio for every one of the listed stocks (the last two pieces of information are neither up to date nor accurate and are hence unusable). In addition, for the week during which a stock "goes ex" a marker is placed next to the price for both capital changes (reasonably accurate and complete) as well as for dividend (incomplete and not reliable). The difference in accuracy of data on "ex dates" for capital changes and dividend payments is not surprising in view of the fact that the former are likely to cause a big change in the quoted price and in addition the "year high and low prices" have to be recomputed by the staff of the newspaper.

The first task in the data collection work is to xerox a complete set of the Weekly Share Market Reports covering the entire research period. The backcopies of the newspaper are obtained from the Penang Public Library (upto 1971) and from the collection at the Science University (since 1971, the year the University came into existence).

#### (B) THE STOCK EXCHANGE GAZETTES

This publication has appeared in three different incarnations during the research periods - first as the Stock Exchange of Malaya Gazette, then as the Stock Exchange of Singapore and Malaysia Gazette and finally as the Kuala Lumpur Stock Exchange Gazette. However, in all



its incarnations, it is supposed to serve the same function; that is, as the official monthly Stock Exchange news publication. It is supposed to provide a complete report on what is happening in the stockmarket. Its contents may seem extensive on paper but it is only in recent years that its contents can be regarded as adequate. It now provides a monthly summary of the accounting changes and transaction data for all listed stocks, a complete record of all corporate announcements, information on indices and market capitalisation and even summaries of all annual reports. However, for much of its existence, it was poorly organised and the information provided was usually out-dated, often incomplete and patchy since it has always been produced by inexperienced and non financially literate staff. For example, such vital information as the ex-date for capital changes and dividend payments was not included until after 1983. However, it does provide an almost complete record of all capitalisation changes, dividend announcements. Even if it does not include all the data, much of the information therein is usable and reasonably accurate. It is therefore the primary source for accounting information in the pre 1973 years. Its other great advantage is that it proved possible to assemble a complete set of this publication from its first issue (June, 1960), either in its original or xeroxed form. This means that the data gathering from this source could be done in Penang, resulting in much time saved.

#### (C) THE RECORDS OF MESSRS. THONG & OH, STOCKBROKERS

As has been pointed out in Chapter Two, very few of the local stockbrokers carry out research of any sort. However, they do keep some sort of records on the important dates connected with capitalisation changes and dividend payments in order to ensure correct pricing in relation to dividend, bonus or rights ranking. Some of the larger firms also keep other types of information on listed companies. Messrs. Thong & Oh, the largest and second longest established stockbroker firm in Penang, is kind enough to allow access to its records and it has proved to be an invaluable source of data. The records held only go back to the year 1973 although the firm has been in existence for considerably longer. The information is obtained from either the listed firms directly or from the Stock Exchanges via daily telexes and recorded in hand written form. Preliminary checking indicates that their records are the most accurate. They are therefore used as the primary post 1973 source of dividend dates and dividend amounts.

#### (D) THE LIBRARY OF THE STOCK EXCHANGE OF SINGAPORE

The KLSE has proved to be extremely uncooperative in the way of opening its facilities for the use of this researcher. As a result, the Library of the SES is used in its place. This has proved to be an invaluable source for obtaining xeroxes of official publications (i.e. Gazette and Yearbook), unobtainable from other sources, as well as acting as the "last resort" source of other information. The SES Library contains a complete set of annual reports for all listed companies going back to the mid Sixties in addition to complete sets of all official publications since the beginning. It also holds in hard copy form the "Report to Members" which is a daily record of all corporate announcements received. Unfortunately, the complete collection of this is available only since 1973; prior to that year, copies of this record tend to be patchy and prior to the late Sixties, all copies seem to have been destroyed. Although this record is usable, it is extremely time consuming to gather the required information in this way and it is therefore only used as a last resort when the required information is not available elsewhere.

The disadvantage of the SES Library is that it is quite distant from Penang. Its use requires travelling down to Singapore and spending several days in the city and all that implies in terms of cost and time.

#### (E) THE STOCK EXCHANGE YEARBOOKS

This publication provides a short history of each of the listed company as well as five years' summary of financial information. The range of information provided has become fuller with the years. In the latest issues, it provides all important dates as well as financial information. In addition to being used as a secondary source of information on capital changes, dividend payments and earnings, it proves invaluable in providing several small but vital pieces of information such as name changes, first listing dates, changes in financial year end, nature of corporate restructuring and reorganisations, earnings and dividend ranking dates for new shares created as well as information on subsidiaries and major shareholders.

Again, it proved feasible to assemble a reasonably complete set of

this publication going back to 1968.

#### (F) CORPORATE ANNUAL REPORTS

This is only a minor source of information, although important nevertheless. Firstly, it is used for discovering how corporate restructuring and reorganisations (very common for local listed companies) have been carried out. Secondly, it is used for gathering information of "external" capitalisation changes. (An explanation of the difference between "internal" and "external" capitalisation changes will be provided in Section 6.5.)

#### 6.4.3 - COLLECTION OF TRANSACTION DATA

As outlined in Section 6.4.1, the collection of these data is straightforward. The one point which needs further elaboration is the fact that these data were keyed in and used without being counterchecked against a second source (although the recording and keying-in are double-checked). There are two reasons for this. Firstly, the frequency of sampling means that the error rate is likely to be lower and whatever errors there may be would not have such profound effect on the subsequent computation and analysis. Secondly, there is no likelihood of the errors exerting a cumulative effect as in the case of capitalisation information where an error in the computation of the adjustment factor at the beginning would lead to all subsequent figures being in error. Thirdly, it would be of doubtful benefit to check the data against a second source which is no more accurate since the most obvious second source is the data published in another newspaper. It would be extremely time consuming to check the data against the only known and available third source, that is, the hardcopy of wire information service (e.g. Reuter). Furthermore, this source of information is not tabulated and it is doubtful if it is possible to accumulate a complete set covering 16 years. For these reasons therefore, the information obtained from the New Strait Times' Weekly Sharemarket Reports is assumed to be accurate.

#### 6.4.4 - COLLECTION OF CORPORATE ACCOUNTING DATA

The three types of data in this category are "events driven", so to

speak. That is, a clutch of information would come into being every time there is an announcement of a new corporate event of one of these types. At each announcement, the data which become available can be further subdivided into: (1) Information on dates and (2) Other types of information on the nature of the announcements. There are therefore altogether six major classes of information :-

- (1) Information on dates connected with capitalisation changes (CD);
- (2) Information on various characteristics of capitalisation changes (CC);
- (3) Information on dates connected with dividend announcements (DD);
- (4) Information on various characteristics of dividends (DC);
- (5) Information on dates connected with earnings announcements (ED);
- (6) Information on various characteristics of earnings (EC).

Note: Letters inside brackets show the short form of each class of information to be used in Table 6.6.

The six sources of information used to obtain the above classes of information for the database may be divided as follows:-

#### MAJOR SOURCES

- (1) The Stock Exchange (MSE/SEMS/KLSE) Monthly Gazette;
- (2) The data files of Messrs Thong & Oh, Stock Brokers;

#### MINOR SOURCES

- (3) The weekly newspaper Share Market Reports; (4) The Library of the Stock Exchange of Singapore;
- (5) The Stock Exchange Yearbooks; and
- (6) The Annual Reports of the selected companies.

The relationship between the various types of information and the various sources of data is summarised in Table 6.6 appended below.

TABLE 6.6

## RELATIONSHIP BETWEEN TYPES OF INFORMATION AND THEIR SOURCES

DATA TYPE	PRE 1973						POST 1973					
	CD	CC	DD	DC	ED	EC	CD	CC	DD	DC	ED	EC
GAZETTE	+	*	+	*	+	+	+	*	+	*	+	*
STOCKBROKER	-	-	-	-	-	-	*	*	*	*	-	-
NEWSPAPER	+	-	+	-	-	-	+	+	+	+	+	+
SES LIBRARY	+	+	+	+	+	+	*	*	*	*	*	+
YEARBOOK	-	*	-	*	-	+	-	*	-	*	-	+
AN. REPORT	+	*	+	*	+	+	+	*	+	*	+	+

\* = This information is almost completely obtainable from this source

+ = This information is partially obtainable from this source

- = This information unobtainable from this source

The information on capitalisation changes and dividends can be regarded as the most important pieces of information to be collected as they provide the means of computing the return on investment required for the computation of beta in the first place and the for carrying out various efficiency tests in the second place. As it turns out, it proves to be possible to assemble a most accurate collection on the CC and DC types of data. The CC and CD types of data prove to be slightly more difficult but in the event, a very great percentage of the data collected appears to be very accurate as well. The collection of earnings data, primarily for deriving the Earnings Per Share information required for Earnings Forecast Error (EFE) tests to be described in Chapter Eight, proves to be less tractable. There are several serious problems which make the collection of data incomplete. These problems will be elaborated in Section 6.4.5. The rest of this section will describe in some detail how the accounting data in general are collected.

As is usual with this type of data gathering, both the transcription and keypunching of data are double checked for accuracy. In addition, data gathering from the above sources follows the general principles stated below. The reasons for adopting these principles will be briefly explained later.

- (1) The same piece of information is obtained from two sources where possible.
- (2) Prior investigations are carried out to determine which of the alternative sources for a piece of information is the most accurate and that particular source is established as the primary source while another source(s) is designated as the second source.
- (3) Where it proves impossible to obtain a particular piece of information, an estimate is usually applied.

TWO SOURCES ARE USED For the sake of accuracy, all capitalisation, dividend and earnings data are obtained from one primary source and cross checked against a secondary source. Accuracy is especially vital in information on capitalisation changes where a single error would affect all subsequent computations. (This class of information is in fact triple checked for accuracy.)

#### DETERMINING THE PRIMARY SOURCE FOR EACH TYPE OF INFORMATION

Preliminary investigations are carried out using a small sample of stocks to determine which of the alternative sources of information for each type is the most accurate and complete. That source is then defined as the primary source and where possible all data of that type is collected from this source. Any missing data would be gathered from one of the other secondary sources. The data from the primary source is then cross checked against one or more of the secondary sources. Where there is disagreement, the data from the primary source is taken as the correct one unless experience shows that that particular piece of information may be wrong. Table 6.7 below gives the primary and secondary sources of information for each of the six types of information as defined previously.



TABLE 6.7

## SOURCES OF INFORMATION

	PRE 1973		POST 1973	
	PRIMARY	SECOND.	PRIMARY	SECOND.
DATES OF CAPITAL CHANGES	GAZETTE	N'PAPER LIBRARY	BROKERS	GAZETTE LIBRARY
OTHER DATA ON CAPT. CHANGES	YEARBOOK	ANN. REP. GAZETTE	YEARBOOK	ANN. REP. BROKERS
DATES OF DIVIDEND PAYMENTS	GAZETTE	N'PAPER LIBRARY	BROKERS	GAZETTE LIBRARY
OTHER DATA ON DIV. PAYMENTS	YEARBOOK	ANN. REP. GAZETTE	YEARBOOK	ANN. REP. GAZETTE
DATES OF EARNINGS ANNOUN'T (INTERIM)	NONE		AS DIV	(LIBRARY
(FINAL)	AS DIV.	GAZETTE LIBRARY		(N'PAPER
OTHER EARNINGS DATA (INTERIM)	NONE		GAZETTE	LIBRARY
(FINAL)	YEARBOOK	GAZETTE ANN. REP.	YEARBOOK	GAZETTE ANN. REP.

MISSING DATA REPLACED BY ESTIMATES Certain pieces of data (apart from those connected with earnings announcements to be discussed later), particularly for the earlier years of the research period, prove to be very elusive. Most of these are in connection with dividend announcement dates and dates connected with internal capitalisation changes. In these cases, estimates have to be applied. In the former cases, however, as most companies do attempt to make their dividend announcements close to the same date every year, the use of estimates in these instances would not lead to gross errors. In all cases where the missing data have been replaced by an estimate, a marker is applied to indicate the method of estimating the missing data.

Exhibit 6.1, 6.2 and 6.3 at the end of this chapter show respectively the information file in respect of Capitalisation Changes, Dividends and Earnings for one of the sample firms (Boustead Holdings Berhad). (This particular company is chosen because it gives a reasonably

complete set of examples of events met by the listed companies). Explanatory notes are appended beneath the printout of each file in respect of each piece of data.

#### 6.4.5 - PROBLEMS ENCOUNTERED IN COLLECTING EARNINGS DATA

The earnings information on each of the sample firms is required for the conducting of the Earnings Forecast Tests. In order to conduct this test, the Earnings Per Share (EPS) of each of the sample firms is required for every earnings announcement. To compute the the EPS figure, one would need the Profit After Tax and the Number of Shares figures for each announcement. There is little difficulty getting the latter data as it is already part of the Capitalisation Changes files. The former figures prove to be very difficult to obtain, particularly for the earlier years of the research period. The problem is two fold. Firstly, EPS figures are normally given scant regard by local investors and hence such information is treated with little importance by the local publications. Secondly, in respect of the interim earnings figures, even when they are obtainable, only the pretax figures are provided.

The first problem leads to the situation whereby it proves almost impossible to obtain the interim earnings figures for the 1968-1973 period. The Stock Exchange Gazette does not provide these figures until after 1973. Neither the companies themselves (in their annual reports), nor the Stock Exchange Yearbook provided this vital information for the earlier years of the research period. Newspaper announcements also prove to be extremely patchy. Finally, it had to be accepted that it would not be possible to have a complete record. As a result, the interim figures are only recorded in respect of the post-1973 years. This omission is not as great a handicap as it may first appear. In carrying out the EFE tests, a certain forecasting model has to be developed to provide EPS forecast to compare with the actual EPS and the effect of the forecasting error is studied. The first six years of data (i.e. those with only the final EPS) are acceptable for developing the forecasting model since a stable long term relationship is desired. Once the forecasting model is put into use however, it is important that a more timely earnings figure is studied. Of course, at which point (1974), the interim figures are by then available.

The second problem leads to the situation whereby it proves impossible to obtain a complete set of the post-tax interim earnings figures throughout the research period. There are several reasons for the existence of this peculiar situation. Firstly, local taxation laws are such that taxes are paid on an "after the event" basis rather than on a P.A.Y.E. basis. Thus the tax on the earnings for the company fiscal year 1984 will only be paid in 1985 even if the financial year end is in the first half of the 1984 calendar year. Thus there is no legal necessity for corporations to prepare the interim after tax earnings figures. Secondly, for some unknown reason, local newspapers and stock exchange publications always quote earnings on a before tax basis. Until about ten years ago, even the published EPS figures in the Weekly Sharemarket Report were on a pretax basis in defiance of the Western convention. Until today, dividend yield is still quoted on a gross basis. All headlines connected with corporate earnings announcements deal with the pretax profit. Thirdly, the concept of EPS is still alien to a very large segment of the investing public and as a result, corporations do not published the EPS figures automatically as part of the earnings announcement as they do in the West.

Given the near impossibility of obtaining the post-tax interim figures, the EPS figures derived for use in the EFE tests are the pretax EPS figures. While this may seem peculiar at first glance, this unconventional move is not illogical in view of the local situation. If the EPS information is at all used by the investors to price stocks, the figure they use would be that which is conventionally available. Since the figures available are the pretax figures, it is these figures which are likely to be used.

## CHAPTER SIX - PART II

### THE INITIAL OUTPUTS OF THE RESEARCH

#### 6.5 - The Capitalisation Change Adjustment Factors

Since the time of Fisher and Lorie (1964, 1968 and 1970), the algorithm of adjusting for the change in the number of shares held owing to alterations in the capitalisation of the company appears to have become reasonably standardised. However, when working on this project, this researcher came across several problems in this area which do not appear to have been adequately addressed in earlier works. In trying to carry out some of the first tasks of this project, this researcher has to formulate some answers to these questions himself.

##### 6.5.1 - THE PROBLEM OF "INTERNAL" AND "EXTERNAL" CAPITALISATION

The number of shares outstanding of a company can change in one of two possible ways. First, the number of shares can be changed by what may be termed "internally generated events" such as bonus, rights or reverse split. In such events, the percentage ownership of the company in the hand of the existing shareholders does not change although the number of shares owned by each would alter. These capitalisation change events are termed throughout this dissertation as "internal capitalisation change events". The second way by which the number of shares in a company can change is through what may be termed "externally generated events" such as share swaps, conversion of debt instruments and issual of new shares to a third party. In this case, the number of shares held by the existing shareholders remains the same although their percentage ownership of the company would have changed. There is also a possible third way which can be viewed as a combination of the first two. There are the occasional instances when a company split itself into two components by issuing to the pre-existing shareholders two classes of new shares in exchange for their old holdings. In this case, depending on how the individual shareholders deal with the new situation, the event can be looked upon as "internal" or "external" or both. If the shareholders

hold on to both classes of shares, the event may be thought of as an internal one. If they sell out one class of shares and either buy the other class of shares or use the money for some other purpose, it can be thought of as both an internal as well as external event. The computations required to adjust for these two different events are quite different.

In the computing of the return a shareholder gets from investing in a company's shares, the events of importance are the internal events. As far as the pre-existing shareholders are concerned, the external events have no immediate direct effect on their holdings. (There would be other longer term indirect effects such as earnings dilution but these do not concern us in the study of the ex-post return on investment.) Therefore, in the computation of return on investment, the internal capitalisation change adjustment factor (known as 'M' throughout this dissertation) is used. The computation of M for bonus issues, stock splits or reverse splits is clearcut enough and it should not give rise to any controversy. The computation of M to account for rights issues will be discussed in greater detail in Section 6.5.2

The differentiation between internal and external capitalisation changes adopted by this study also has a part to play in the computation of the market return required for the estimation of betas. The normal convention to compute market return is to weight the return on the sampled firms by the number of shares outstanding multiplied by the market price. In adopting this approach, a modification to the commonly accepted method of computing market return is necessary. In a market where there has been a great deal of external capitalisation changes (e.g. Malaysia), the use of the total number of outstanding shares as a weighting factor would bias the market return upwards. In this study therefore, the market return is computed by assuming that the number of shares of a company outstanding at any one time is the product of the initial number of shares and the internal capitalisation adjustment factor (as far as computations for obtaining market portfolio return are concerned). If there had been no external capitalisation changes since the beginning of the research period, this number would be the same as the actual number of shares outstanding. Otherwise, it would be less under most circumstances.

For checking purposes, the external capitalisation adjustment factor

(known throughout this thesis as "N") is also computed. The relationship between M, N and the number of shares of a company outstanding at a given time is given by the equation:-

$$S = I \times M \times N$$

Where : S = Actual Number of Shares Outstanding  
 I = Number of shares outstanding at start of research period  
 or at first listing  
 M = Internal Capitalisation Adjustment Factor  
 N = External Capitalisation Adjustment factor

If M and N have been computed correctly, the calculated S at anyone time should be the same as the actual S and this provides an important countercheck of the accuracy of the work carried out.

This is perhaps the right place to explain the algorithm employed in this project to adjust for the cases where the sample firm chose to split itself into its Malaysian component and its Singaporean component by issuing two classes of shares to its pre-existing shareholders. The method employed here is slightly different from that employed by Fisher and Lorie because of the non-existence of capital gains tax in Malaysia. In these cases, it is assumed that the Malaysian shareholders (who are the investors being studied) would sell out their allocation of Singaporean class of shares and use the proceeds to buy Malaysian class shares to the same value. The valuation date is the first day on which both classes of shares are listed. In these instances, the N for the stocks involved would drop below 1.00. This is only to be expected since there is a reduction in the number of shares in the hand of "outsiders".

#### 6.5.2 - THE PROBLEM OF ADJUSTING FOR RIGHTS

Malaysian companies have a very strong tendency to make rights issues. One third of the sample companies have made one or more rights issues during the research period. Among those which have made rights issues, most of them have made more than one. This tendency to make rights issues can be partly explained by the fact that many of the listed companies are extremely fast growing and partly by the fact that local investors do not regard rights issues as being potentially



dilutive. This has been remarked upon by the Far Eastern Economic Review (Section 2.8). In addition, unlike rights issues of the West, local rights issues are usually made at a considerable discount to the market price which makes rights issues similar to bonus issues to some extent. As a result of these two factors, almost all rights issues are fully taken up. It is rare for the underwriters to have to take up any remainder.

Given such a situation, the method of adjusting for rights described by Fisher and Lorie (op cit) may not be the best choice. Briefly, Fisher and Lorie's algorithm assumes that the shareholders do not incur extra investment in the taking up of a rights issue. Their method assumes that a portion of the rights is sold off such that the sales of the rights balances exactly the payment for the rest of the rights. Fisher and Lorie's method assumes in effect an "open" system whereby there exists other investors who will "bail out" the existing shareholders in the event of a rights issue.

In consideration of the investment environment, it is felt that it is better to assume a "closed" system whereby the existing shareholders have to pay for the additional cost incurred in taking up rights. The cost of rights is therefore included as a "negative dividend" in the computation of the stock return. This negative return has to be "paid for" out of future capital gain or dividend return. This method of adjusting for rights meshes in well with the adopted method of computing stock return which will be discussed in the next section.

The adoption of this method of adjusting for rights, however, gives rise to a problem when conducting two of the efficiency tests - the Dividend Growth Test and the Earnings Forecast Error Test. The problem arises because these tests require the computation of the Dividend Per Share and Earnings Per Share over a long period of time in order to fit a model to describe the growth of each. Over such a long period, the DPS and EPS have to be adjusted for capitalisation changes undergone by the companies. The use of M to adjust for the DPS or EPS to reflect the increase in the number of shares held by the shareholders would result in an upward bias of the "true" DPS and EPS figures in the case of companies which have made rights issues. The upward bias is caused by the fact that the M in themselves do not reflect the cost of rights, unlike the case of computation of stock return whereby the cost of rights is taken into account by the negative dividend. In the former cases, a different adjustment factor

which does take into account the cost of rights has to be used. A different capitalisation adjustment factor which is termed "RM" (based on the Fisher and Lorie method) is therefore computed for those companies which had made rights issues. This is why in Exhibit 6.1 (the example of Capitalisation file), there are three different capitalisation adjustment factors - M, N and RM. RM is the capitalisation adjustment factor which is used for computing the adjusted DPS and EPS required for the efficiency tests.

## 6.6 - Computation Of Return on Investment

### (A) INDIVIDUAL STOCK RETURN

Once the M and the dividend payment stream in respect of each company in the database have been computed, it is then possible to move on to the computation of stock returns. This research follows the normal convention for the great majority of stockmarket research whereby the return on investment is computed in terms of total wealth at the end of the holding period compared with the beginning of the holding period. As has been previously explained, the use of return relative instead of percentage return enables one to derive the logarithm of the return relative which is symmetrical about wealth ratio of 1.00 while percentage return would result in a skewed distribution.

There are some differences in the way capital gains and income taxes are computed in Malaysia. As a result, there are several differences in the computation of return on investment. There is no capital gains tax in Malaysia, hence in the current study no allowance for capital gains tax is necessary. A 40% withholding tax is applied to dividend payments (except for tax exempt dividends). Individual taxpayers may then apply to have the withholding tax use a tax credit to offset total income tax due. Dividend is therefore in effect taxed at the individual's marginal rate of taxation (11%-55% for private individuals). Corporations, pension funds and other institutions are taxed at 40%. For this study, dividend is assumed to be taxed at 40%. Certain dividends are tax exempted for various reasons and where this takes place, no tax is assumed.

The return relative,  $R$  of holding a stock is given by the equation below:-

$$R_{it} = \frac{P_{it} + D_{it}}{P_{i,(t-1)}}$$

Where :  $P$  = Adjusted Price of the  $i$ th stock

$D$  = Adjusted Dividend of the  $i$ th stock received during holding period

In turn the Adjusted Price and the Adjusted Dividend are obtained respectively from the following equations:-

$$P_{it} = p_{it} \times M_{it} \qquad D_{it} = d_{it} \times M_{it}$$

Where :  $M$  = Internal Capitalisation Adjustment Factor

$p$  = Unadjusted Price of the  $i$ th stock

$d$  = Unadjusted Dividend of the  $i$ th stock received during holding period

For this study, the holding period is assumed to be the same as the sampling interval - one week. The assumption of such a short holding period has the advantage of not having to impute dividend re-investment return. The returns for longer holding periods are computed from the weekly return relative assuming continuous compounding with dividend re-investment in the same stock. This is all in line with the time-tested technique and should not give rise to any controversy.

From the simple return relative, the natural logarithm of the return relative,  $\ln(R)$ , can be computed. The residual return,  $RR$ , can then be computed from the  $\ln(R)$  by making use of the Alfa and Beta which are estimated from the regression performed on the individual  $\ln(R)$  on the natural logarithm of the market return relative. This process will be discussed in greater detail in the next section.

#### (B) MARKET RETURN

The algorithm for computing the market return follows closely from the algorithm for computing individual stock return. The following equation is employed for the computation of the market return relative,  $MR_t$ .

$$MR_t = \frac{\sum_{i=1}^n S_{io} \times (P_{it} + D_{it})}{\sum_{i=1}^n S_{io} \times P_{i,(t-1)}}$$

Where :  $P$  = Adjusted Price of the  $i$ th stock in the sample

$D$  = Adjusted Dividend received of the  $i$ th stock during holding period

$S$  = No. of Shares outstanding as previously defined

There is one point of note in the computation of the Market Return. Owing to the fact that the market portfolio is rebalanced every year, the market return for the weeks of one year is based on a different portfolio than the previous and the subsequent year. As a result, there is a discontinuity in the computation of the market return if a 52-week "year" is assumed for each of the market portfolios. Instead a 53-week year (with one week's overlap between 'years') is invoked so as to obtain returns for 52 weeks. Arising from this decision, it is also decided that a "standard" 52-week year is used rather than the Gregorian 52.125-week year. As a result, the research period is two weeks shorter than the actual calendar period.

## 6.7 - Computation of Different Betas And Selection of Beta to Use

### 6.7.1 - THE PROBLEMS OF CHOICE IN THE METHODOLOGY OF ADJUSTING FOR MARKET EFFECT IN STOCK RETURN

The use of CAPM to adjust securities return for market effect will require the researcher to make three major choices as to the methods to employ before arriving at the computed return residual, viz:-

- (1) Which model of CAPM to use;
- (2) Which method of computing beta; and
- (3) Which method of adjusting for market effect.

The question of which model of CAPM to use has been discussed at length in Chapter Five and hence will not be repeated here. It suffices to say that this study decides to employ Sharp's Market Model as the model of CAPM.

The question of which of the three commonly used methods of computing return residual, CAR, API and PPI to use is perhaps not very important as it has been shown by Brown (1978) that all three methods produce very similar result. This project will use the CAR method, partly because it seems to be the most widely used method and partly because its algorithm is said by Brown to be the most conservative.

The second of the three choices above is the one which mainly concerns us at this point. Traditionally, beta is computed simply by regressing individual stock returns on market returns over a long period of time. However, as the holding period gets shorter, the problem of infrequent trading becomes more severe. Infrequent trading gives rise to the problem of low apparent beta and low coefficient of determination (Dimson (1979)). As a result, an additional step has to be employed in order to overcome the the problem of infrequent trading. Since this project employs weekly sampling interval, it is expected that infrequent trading is likely to be a problem. As a result, a decision has to be made as to how best to tackle the problem of low trading.

Several methods for overcoming this problem has been proposed. Of these the better known methods are as suggested by Dimson (1979), Scholes and Willaims (1977) and several others discussed in Dimson. The merit of Dimnson's AC method is discussed at length in Dimson. It appears to this researcher that the superiority of Dimson's method is real and it has been accepted by other workers in this field as well (e.g. Reinganum(1982)). This project therefore will use Dimson's AC method to provide an alternative method to simple regression for computing individual stock betas. The next subsection will discuss the differences in the regression results between simple regression and Dimson's AC regression.

The alfa and beta for each stock are estimated from three years' moving regressions of individual stock returns on market returns although this writer is aware that traditionally much longer period is typically used. (Ball (1972) uses 100 months, Mandelker (1974) uses 60 months). A three year moving regression is chosen as a

compromise between long term regression as is commonly used in the West and the realisation that the stability of betas under local market conditions (as with the Western markets) is very poor. An excessively long period for regression will not give a good estimate of the "real" beta as pointed out by Bar-Yosef and Brown (1977). A short period for regression will lead to excessive fluctuation in the computed results. It is thought that three years provide a reasonable mid point between the two conflicting requirements.

#### 6.7.2 - COMPARISON BETWEEN SIMPLE REGRESSION AND DIMSON'S AC REGRESSION FOR COMPUTING STOCK BETAS

In this section, two important characteristics of the regressions will be examined - the frequency distributions of the computed betas and of the coefficient of determination for the regression. Table 6.8 provides the 20th, 40th, 60th, and 80th percentiles and the median of the beta frequency distributions for each of the blocks of regression carried out (14 regressions are carried out using blocks of three years starting in 1970) in respect of the simple regression and the AC regression. Table 6.9 provides the 20th, 40th, 60th, and 80th percentiles and the median of the frequency distribution of the coefficients of determination for the same computations.

##### (A) THE FREQUENCY DISTRIBUTION OF THE BETAS

There are several points of note from this distribution. Firstly, it is clear that the simple regression gives a beta distribution that is far too low. The grand mean of the distributions is only 0.79 while it should theoretically be 1.00. It is therefore likely that infrequent trading has some influence in producing this result. Secondly, it is clear that Dimson's AC method produces a much higher distribution for the betas than simple regression. But the grand mean of the beta distribution is still apparently low at 0.89. An explanation will be provided later as to why it is not 1.00.

Thirdly, it is fairly obvious that even using three year moving regressions, there is still considerable instability in the computed betas. The value of the median beta can change by 10-12% from one year to the next. However, it is noticeable that the mean beta seldom



risers above 1.00 (only 1 out of 14 sets of regressions). Considering that the betas for two adjacent regressions are computed with two common years of data, this instability is doubly surprising. It is not possible to offer a formal explanation as to why this should be so. From available evidence it seems that the less knowledgeable and speculative investors are far more likely to enter the market during the "bull market" phases and that their choice of investment may be more eclectic compared with the knowledgeable investors who seems to stay with the large companies. As a result, during the bull markets, the smaller capitalisation stocks' whose betas are greater tend to move up more in value, thus taking mean beta closer to 1.00.

Fourthly, it is also discernible that over the 14 blocks of regression carried out, there is a tendency for the two distributions to become closer, especially at the lower end of the distribution. This is probably a sign that infrequent trading becomes less of a problem as the market matures.

#### (B) THE DISTRIBUTION OF THE COEFFICIENTS OF DETERMINATION

Similar comments can be made about the comparison between the frequency distribution of the coefficient of determination for simple versus AC regression. It is obvious that AC regressions produce higher coefficients of determination than the simple regressions. The grand mean is 0.3498 as against 0.2800, or 7% higher. Also, for both kind of regressions, the variability of the coefficients is very high reflecting the highly unstable nature of the stockmarket. For AC regression, the median coefficient can be as high as 0.4550 (1975) to as low as 0.2376 (1971). Lastly, there is some indications that the coefficients of determination are becoming greater over the years. Again, this reflects the increasing maturity of the Malaysian market.

#### (C) EXPLANATION FOR THE LOW COMPUTED MEAN BETA

The beta for the individual stock is obtained by regressing the individual stock returns on the overall market returns. The market returns are computed from a representative market portfolio with market value weighting. If the distribution of the beta is independent of market capitalisation, the resultant beta distribution should have a mean value of about 1.00. But as previously mentioned,

there is reason to believe that in Malaysia, the stocks of large companies have higher betas than small companies even after adjusting for infrequent trading. If the mean beta is computed using market value weighting instead of equal weighting, there is reason to believe that the resultant mean would have a value close to 1.00.

As proof of this conjecture, this exercise is carried out for the AC beta frequency distribution for the year 1977. The resultant mean market value weighted beta has a value of 1.006 while the equal weighted mean is 0.79. The same computation is carried on the frequency distribution of the simple beta for the same year and this produces a figure of 0.97 as against the equal weighted mean of 0.75. It is therefore clear that there is a sound reason for this unusual result. A further piece of evidence can be seen by computing the mean market value for the five quintiles of the frequency distribution of the AC betas for the same year. The result can be seen below:-

Quintile Of AC Betas	Mean Market Value of Companies Within Each
First	\$74.66 M
Second	\$110.22 M
Third	\$120.91 M
Fourth	\$125.24 M
Fifth	\$226.90 M

From the above discussion, it can be seen that the betas computed using Dimson's AC method are far superior to the betas computed using simple regression. It is therefore decided that this method should be adopted for the computation of beta for this project.

TABLE 6.8

## DISTRIBUTION OF COMPUTED BETAS

		PERCENTILE					MEAN
		20	40	50	60	80	
1970	SIMPLE	0.36	0.84	0.95	1.05	1.29	0.87
	AC	0.65	0.84	1.06	1.15	1.43	1.04
1971	SIMPLE	0.51	0.75	0.88	1.00	1.19	0.85
	AC	0.68	0.89	0.95	1.03	1.28	0.98
1972	SIMPLE	0.35	0.55	0.60	0.67	0.87	0.63
	AC	0.38	0.65	0.82	0.88	1.13	0.81
1973	SIMPLE	0.50	0.66	0.78	0.86	1.00	0.74
	AC	0.63	0.84	0.89	0.99	1.12	0.87
1974	SIMPLE	0.37	0.67	0.75	0.80	1.02	0.72
	AC	0.63	0.82	0.90	0.92	1.13	0.87
1975	SIMPLE	0.42	0.68	0.72	0.91	1.12	0.78
	AC	0.48	0.78	0.90	0.99	1.20	0.85
1976	SIMPLE	0.25	0.55	0.67	0.84	1.26	0.75
	AC	0.24	0.71	0.78	0.86	1.18	0.76
1977	SIMPLE	0.30	0.56	0.69	0.80	1.26	0.75
	AC	0.30	0.69	0.78	0.97	1.24	0.79
1978	SIMPLE	0.45	0.65	0.73	0.86	1.15	0.78
	AC	0.51	0.72	0.79	0.90	1.18	0.82
1979	SIMPLE	0.55	0.71	0.85	0.92	1.13	0.81
	AC	0.61	0.80	0.84	0.90	1.07	0.80
1980	SIMPLE	0.48	0.80	0.91	1.00	1.13	0.85
	AC	0.61	0.82	0.95	1.08	1.25	0.92
1981	SIMPLE	0.44	0.73	0.83	1.00	1.19	0.85
	AC	0.55	0.80	0.91	1.02	1.34	0.97
1982	SIMPLE	0.49	0.71	0.90	0.95	1.26	0.86
	AC	0.62	0.84	1.00	1.06	1.31	1.00
1983	SIMPLE	0.48	0.69	0.84	0.96	1.27	0.83
	AC	0.56	0.86	0.93	1.00	1.31	0.94
MEAN	SIMPLE	0.43	0.68	0.76	0.90	1.15	0.79
	AC	0.56	0.79	0.89	0.98	1.23	0.89

TABLE 6.9

DISTRIBUTION OF R SQD FOR COMPUTED BETAS

		PERCENTILE					MEAN
		20	40	50	60	80	
1970	SIMPLE	0.0142	0.1931	0.2551	0.2898	0.3759	0.2258
	AC	0.1459	0.2583	0.3100	0.3463	0.4359	0.2927
1971	SIMPLE	0.0293	0.1203	0.1769	0.2308	0.3487	0.1987
	AC	0.1112	0.1973	0.2376	0.2707	0.4141	0.2659
1972	SIMPLE	0.0484	0.1365	0.1663	0.1902	0.2770	0.1704
	AC	0.1553	0.2306	0.2693	0.3123	0.3777	0.2765
1973	SIMPLE	0.1798	0.2881	0.3317	0.3849	0.4958	0.3270
	AC	0.2307	0.3655	0.4171	0.4670	0.5636	0.4065
1974	SIMPLE	0.1479	0.3013	0.3242	0.3916	0.5402	0.3463
	AC	0.2328	0.3597	0.4212	0.4676	0.5775	0.4143
1975	SIMPLE	0.1010	0.3012	0.3702	0.4753	0.6485	0.3921
	AC	0.2211	0.4073	0.4550	0.5523	0.6850	0.4593
1976	SIMPLE	0.0350	0.1616	0.2517	0.3965	0.5765	0.3238
	AC	0.1535	0.2909	0.3912	0.4437	0.6031	0.3923
1977	SIMPLE	0.0212	0.1441	0.2724	0.3542	0.4861	0.2864
	AC	0.1402	0.3169	0.4021	0.4638	0.5549	0.3836
1978	SIMPLE	0.0826	0.1553	0.2346	0.2598	0.4181	0.2563
	AC	0.1671	0.2586	0.2940	0.3385	0.4715	0.3173
1979	SIMPLE	0.0739	0.1757	0.2669	0.3268	0.4579	0.2704
	AC	0.1844	0.2747	0.3328	0.3835	0.5045	0.3328
1980	SIMPLE	0.0940	0.2394	0.3075	0.3201	0.4369	0.2822
	AC	0.1816	0.2900	0.3416	0.3978	0.4934	0.3382
1981	SIMPLE	0.0639	0.2060	0.2758	0.3154	0.4640	0.2748
	AC	0.1196	0.2802	0.3542	0.3860	0.5089	0.3314
1982	SIMPLE	0.0967	0.2337	0.2645	0.3059	0.4873	0.2855
	AC	0.1646	0.2962	0.3321	0.3973	0.5202	0.3422
1983	SIMPLE	0.1014	0.2157	0.2566	0.2935	0.4510	0.2804
	AC	0.1899	0.2713	0.3402	0.3841	0.5036	0.3438
MEAN	SIMPLE	0.0777	0.2051	0.2682	0.3239	0.4617	0.2800
	AC	0.1713	0.2927	0.3499	0.4008	0.5153	0.3498

## EXHIBIT 6.1

## AN EXTRACT FROM CAPITALISATION FILES - BOUSTEAD HOLDINGS BHD

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
ANN'T PERIOD	ANN'T DATE	EX PERIOD	EX DATE	M	N	RM	CAPT'N AMOUNT	CHANGE TYPE	COST OF RIGHTS	NO. OF SHARES	MARKERS
810	070568	812	240568	1.4	1.0	1.4	2/5	B	-	7000	-
966	040571	968	190571	2.0	1.0	1.8438	3/7	R	0.2142	10000	-
1016	190472	1020	190572	2.4	1.0	2.2213	1/5	B	-	12000	-
1070	040573	1072	180573	3.0	1.0	2.7657	1/4	B	-	15000	-
-	-	1133	150774	3.0	1.0061	2.7657	-	SI	-	15091	-
-	-	1200	311075	4.569	0.6606	4.2122	-	SO	-	15091	3 1
-	-	1259	161276	4.569	0.666	4.2122	-	SI	-	15230	1 1
-	-	1259	161276	4.569	0.9192	4.2122	-	SI	-	21000	1 1
1265	260177	1266	310177	9.138	0.9192	8.4243	1/1	B	-	42000	-
1332	080578	1333	160578	10.052	0.9192	9.2667	1/10	B	-	46100	-
1430	270380	1439	290580	13.402	0.9192	12.3556	1/3	B	-	61600	-
1493	120681	1500	310781	17.869	0.9192	15.4441	1/3	R	0.6667	82133	-
1493	120681	1507	140981	26.803	0.9192	23.1662	1/2	B	-	123200	-
-	-	1568	151182	26.803	1.0642	23.1662	-	SI	-	142625	3
1621	191183	-	080384	26.803	1.1067	23.1622	-	A	-	148315	-

## Notes On the Variable in each Column:

(1) Announcement Period : Each week during the research period is given a code number and the date of the event is given the corresponding period code.

(2) Announcement Date : Self explanatory

(3) Ex Period : Self explanatory

(4) Ex Date : Self Explanatory

(5) M : The internal capitalisation change adjustment factor

(6) N : The external capitalisation change adjustment factor

(7) RM : The internal capitalisation change adjustment factor which takes into account the cost of rights

(8) Capitalisation Amount : The quantum of the capitalisation change. "1/X" stands for "One for X"

(9) Capitalisation Type : The type of capitalisation change undergone. E.g. B = Bonus and R = Rights

(10) Cost of Rights : The cost of rights per share held in term of Malaysian currency

(11) No. Of Shares : No of shares outstanding in millions

(12) Markers : Markers to indicate source and accuracy of data or type of estimate

## EXHIBIT 6.2

## AN EXTRACT FROM THE DIVIDEND FILES -BOUSTEAD HOLDINGS BHD

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
ANN'T PERIOD	ANN'T DATE	EX PERIOD	EX DATE	PAY'T PERIOD	PAY'T DATE	DIV'D PER SH	DIV'D TYPE	DENOM	FISCAL YEAR	12-MONTH DIVIDEND
814	070668	816	160668	818	290668	0.15	F/T	M	1267	0.12
846	160169	848	300169	850	080269	0.05	I/T	M	1268	0.09
865	290569	868	140669	870	300669	0.10	F/T	M	1268	0.09
897	070170	899	230170	901	020270	0.05	I/T	M	1269	0.09
916	210570	920	170670	922	290670	0.10	F/T	M	1269	0.09
949	070171	951	220171	953	010271	0.05	I/T	M	1270	0.09
966	040571	968	180571	970	010671	0.10	F/T	M	1270	0.09
1002	100172	1003	200172	1005	310172	0.05	I/T	M	1271	0.09
1016	190472	1020	170572	1022	010672	0.10	F/T	M	1271	0.09
1053	050173	1054	080173	1057	010273	0.05	I/T	M	1272	0.09
1070	020573	1076	140673	1080	090773	0.10	F/T	M	1272	0.09
1101	051273	1103	211273	1106	110174	0.075	I/T	M	1273	0.105
1121	220474	1122	030574	1127	010674	0.125	F/T	M	1273	0.12
1154	101274	1155	191274	1159	110175	0.075	I/T	M	1274	0.12
1173	240475	1177	190575	1180	090675	0.125	F/T	M	1274	0.12
1208	221275	1209	291275	1211	160176	0.075	I/T	M	1275	0.12
1226	280476	1228	100576	1231	030676	0.125	F/T	M	1275	0.12
1259	161276	1261	271276	1263	140177	0.075	I/T	M	1276	0.12
1279	050577	1281	160577	1284	040677	0.0625	F/T	M	1276	0.0825
1309	011277	1310	091277	1314	060178	0.0375	I/T	M	1277	0.06
1332	080578	1333	160578	1337	100678	0.0625	F/T	M	1277	0.06
1361	301178	1363	131278	1367	120179	0.05	I/T	M	1278	0.0675
1383	040579	1385	180579	1389	150679	0.075	F/T	M	1278	0.075
1413	301179	1415	141279	1419	110180	0.05	I/T	M	1279	0.075
1430	270380	1437	160580	1442	160680	0.075	F/T	M	1279	0.075
1464	211180	1467	081280	1472	150181	0.05	I/T	M	1280	0.075
1486	240481	1491	290581	1495	250681	0.075	F/T	M	1280	0.075
1505	160981	1507	140981	1524	150182	0.05	I/T	M	1281	0.06
1535	310382	1542	210582	1547	250682	0.075	F/T	M	1281	0.06
1570	021282	1572	131282	1577	170183	0.025	I/T	M	1282	0.06
1591	280483	1595	230583	1600	280683	0.05	F/T	M	1282	0.045
1623	071283	-	1283	-	270184	0.0375	I/T	M	0684	0.075

Notes on the variable in each column

(1) Announcement Period : Self explanatory

(2) Announcement Date : Self explanatory

(3) Ex Period : Self explanatory

(4) Ex Date : Self explanatory

(5) Payment Period : Self explanatory

(6) Payment Date : Self explanatory

(7) Dividend Per share : The dividend per share in term of currency unit

(8) Dividend Type : Markers to indicate dividend type and tax status

(9) Denomination : The currency which is used for dividend payments

(10) Fiscal Year : The financial period for which the dividend is made

(11) 12-Month Dividend : This is the dividend in Malaysian currency paid out per share after adjusting for exchange rate for the previous 12 fiscal months



## EXHIBIT 6.3

## AN EXTRACT FROM THE EARNINGS FILES - BOUSTEAD HOLDINGS BHD

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
ANN'T	ANN'T	DIV'D	EARN'G	DENOM.	FISCAL	HALF YR	YEAR	ADJ. 12-MONTH
PERIOD	DATE	STATUS	TYPE		YEAR	PBT	PBT	PBT
814	070668	1	21	M	1267	-	1800	1800
846	160169	1	11	M	1268	-	-	-
865	290569	1	21	M	1268	-	1416	1416
897	070170	1	11	M	1269	-	-	-
916	210570	1	21	M	1269	-	1614	1614
949	070171	1	11	M	1270	-	-	-
966	040571	1	21	M	1270	-	1777	1777
1002	100172	1	11	M	1271	-	-	-
1016	190472	1	21	M	1271	-	3105	3105
1053	050173	1	11	M	1272	-	-	-
1070	020573	1	21	M	1272	-	6079	6079
1101	051273	1	11	M	1273	-	-	-
1121	220474	1	21	M	1273	-	8139	8139
1154	101274	1	11	M	1274	4702	-	-
1173	240475	1	21	M	1274	6754	11456	11456
1208	221275	1	11	M	1275	3655	-	10409
1226	280476	1	21	M	1275	2081	5736	5736
1259	161276	1	11	M	1276	2759	-	4840
1279	050577	1	21	M	1276	5897	8656	8656
1309	011277	1	11	M	1277	6513	-	12410
1332	280578	1	21	M	1277	8613	15126	15126
1361	301178	1	11	M	1278	6546	-	15159
1383	040579	1	21	M	1278	12106	18652	18652
1413	301179	1	11	M	1279	8704	-	20810
1430	270380	1	21	M	1279	14716	23420	23420
1456	260980	1	11	M	1280	11804	-	26520
1486	220481	1	21	M	1280	12303	24107	24107
1507	160981	1	11	M	1281	8020	-	20323
1535	310382	1	21	M	1281	8125	16145	16145
1570	290982	1	11	M	1282	4018	-	12143
1591	270483	1	21	M	1282	16332	20350	20350

## Notes On The Variable In Each Column:

- (1) Announcement Period : Self explanatory
- (2) Announcement Date : Self explanatory
- (3) Dividend Status : Paying concurrent dividend or not
- (4) Earnings Type : Markers to indicate earnings type and tax status
- (5) Denomination : currency in which earnings are stated
- (6) Fiscal Year : Self explanatory
- (7) Half Year Profit Before Tax : Self explanatory
- (8) Year Profit Before Tax : Self explanatory
- (9) Adjusted 12 Month Profit Before Tax : The announced profit before tax for the 12 previous fiscal months adjusted for exchange rate

## CHAPTER SEVEN

### ANALYSIS OF DATA PART I - EFFICIENCY TESTS IN RESPECT OF WEAK FORM INFORMATION

#### 7.1 - Introduction to Chapters Seven and Eight

As explained in Chapter One, two of the four objectives of this dissertation are: (1) To carry out tests on the informational efficiency of the Malaysian market; and (2) To compare the results of such tests with similar tests on the Western markets (mainly the US and the British). In order to make such comparisons more meaningful, a wide range of information will be tested. In the first instance, the range of information to be tested can be divided along the traditional weak form and semi-strong types or as they ought to be known more appropriately as respectively transaction information and accounting information. Chapter Seven will discuss the methods and results of the tests conducted on the transaction information and Chapter Eight will discuss tests conducted on accounting information.

In line with what is stated in the foregoing paragraph, tests will be conducted on various types of information which have been found to be reasonably efficiently treated by the Western market using the schema developed in Chapter One (that is, stage II and III types of efficiency). Apart from this, the range of information chosen is also determined by firstly, the necessity to replicate only the better known and well tested methods of the West, and secondly, by the availability of information in the database. Based on this, it has been decided to select the following three types of transaction information for testing under Malaysian conditions:-

- (1) Stock Price Periodicity (Short, Medium and Long Term);
- (2) Stock Price Moving Averages; and
- (3) Relative Strength.

From past work on the Western markets, we can make certain statements

about how efficiently these types of information are treated by the Western stock markets. (The papers on these tests have been previously discussed in Chapters Three and Four and will be mentioned briefly later in this chapter.) It is now generally accepted that information on short term periodicity of the stock prices is very efficiently treated (stage III) in that it is not possible to uncover any short term periodicity in stock prices. There is, however, less unanimity over the medium and long term periodicity although it is generally accepted that there is not much gain to be exploited there (stage II). Moving average information appears to be efficiently treated as well (stage III) as it is not possible to obtain abnormal gain from trading methods based on moving averages. Finally relative strength type of information appears to be also efficiently treated (stage III) for the same reason.

This chapter will describe three sets of tests based on these types of information performed on the Malaysian stock prices and they will be discussed in the following sections of this chapter:-

7.2 - Method and results of tests for the periodicity in Malaysian stock prices;

7.3 - Method and results of moving average tests;

7.4 - Method and results of relative strength tests.

Each of the above sections will be further divided into the following four subsections for discussion:-

- Background to the tests;
- Test method and sample used;
- Results;
- Conclusion.

However, each of the section may not follow rigidly the above format.

## 7.2 - Tests for Periodicity in Malaysian Stock Prices

### 7.2.1 - BACKGROUND TO THE TESTS

The existence of periodicity in economic time series is a subject of controversy. Stock price series, like other economic time series are subjected to much argument among researchers in this field and have been subjected to many tests conducted over the last thirty odd years. However, much of the testing (until recently) were for the uncovering of short and medium term cycles in that most of the tests were serial correlation tests on data lagged by period of six months or less. This academic emphasis on testing for short term cycles is in contrast to the belief of the practitioners in the field of investment. Apart from floor specialists who are in a position to take advantage of the short term swings as well as not having to pay commission on their trades, most investors are more interested in long term cycles. Their interest is based on the very practical consideration that short term cycles do not allow for adequate margin to cover transaction costs. If an American trader can make a consistent 10% per year abnormal gain on his deals (which may be thought of as a very good margin), he is not likely to be interested in cycles which are less than six months in length since his turnaround transaction cost would be about 4%.

There have been many papers on short term auto-correlation tests; the most wellknown of which is probably Fama (1970). The general conclusion is that for periods up to one month, there is little testable autocorrelation. There were, for a time far fewer tests specifically conducted to examine the longer term periodicity of stock prices. Of the better known earlier papers are Granger and Morgernstern (1963) and Allvine and O'Neill (1980). While the former examined the whole of the power spectrum, the latter was more interested in the four-year cycle. Both papers agreed that there was a four year cycle but they could not agree on its significance. Rozeff and Kinney (1976) looked at the cycles up to one year in length using autocorrelation and both parametric and non-parametric tests and concluded that there was a significant one year cycle which is in line with the general belief on Wall Street. A very large number of tests have been carried out during the early Eighties to test for the so-called "turn-of-the-year" anomaly. In general, almost all of these

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tests show this effect. However, all attempts so far to provide an explanation for this anomaly have failed.

Information on the existence of periodicity can be said to be one of the simplest to uncover and to be applied to stockmarket trading. If a market shows periodicity of a large amplitude in its stock price series, it can be said to be a very inefficient one indeed. For it requires only simple statistical tools to uncover periodicity and the application of this knowledge to trading cannot be simpler.

#### 7.2.2 - TEST METHOD AND SAMPLE

The test method is relatively straightforward and follows closely the methodology of the past tests. The past auto-correlation and spectral analysis tests had generally used the first difference in the price series while Allvine and O'Neill employed a periodic trading strategy as well. The use of the first difference in the price series has two defects. Firstly, the use of the price alone does not take into account dividend return. The ex-dividend effect alone could conceivably introduce a cycle in line with the frequency of dividend payments (typically twice a year in Malaysia). Secondly, with the tests being carried out on a body of data covering a long period of time, the first difference itself is non-stationary. For these reasons therefore, the current series of auto-correlation tests will be conducted on the logarithm of the return relatives which is a stationary series.

A serial correlation programme developed by the Department of Business Studies of the University of Edinburgh is used for examining the return series. The individual return series are examined for auto-correlation for short, medium and long terms. Two series of tests are run, one using the weekly return relatives and the other the monthly return relatives. In addition, the market return series is also tested. The reason for testing the monthly return relatives as well as weekly return relatives is that it is thought that for longer differencing periods (one year or more), the weekly return may be too fine a measure of human behavior (Rozeff and Kinney used one month return relatives in their study of longer term cycles). The following lags are tested:-

1-18 Weeks

4-18 Weeks

24-28 Weeks

24-28 Weeks

48-56 Weeks

48-56 Weeks

200-216 Weeks

204-216 Weeks

The choice of lags to be tested reflects the past work carried out and the "obvious" nodes in terms of time (such as 13 and 26 weeks) which are commonly mentioned in technical publications. The monthly auto-correlation tests are carried out using overlapping periods.

The sample is based on all the stocks in the database irrespective of listing history since equal emphasis is being given to short as well as long term cycles. In addition, the same tests are carried out using the aggregated market return relative series. At first glance the large number of stocks in the sample may be thought of as providing a robust test for serial dependence but stocks in the same market are seldom completely mutually independent in their movements. However, given the fact that the stocks of different market sectors tend to conform to different cycles (this can be partly seen by examining the sector indices) and the fact that the market factor only has low power of determination on individual Malaysian stock prices (the median coefficient of determination of the stock return against the market return being only 0.35), the individual stock price series have greater independence than stocks of the Western markets. A sample of nearly 80 stocks over such a long timespan should provide a reasonably powerful test of the periodicity if it exists.

### 7.2.3 - RESULTS AND DISCUSSIONS

#### (A) THE WEEKLY RETURN SERIES

In all, 49 runs of the auto-correlation test are carried out on each of the 79 (78 stock series and one market series) return relative series available. The results are obviously far too voluminous to be reported fully here. They are summarised in the form of the frequency distribution of the correlation coefficients for each of the lags tested for those differencing periods which have the greatest degree of dependence. In addition, the standard errors in



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respect of these lags are also shown and the number of sample stocks whose correlation coefficients exceed twice the standard error is indicated. This summary is shown below as Table 7.2.1.

As these tests do not duplicate exactly past tests in terms of differencing intervals, the results of these tests can only be compared in parts to the results of previous tests. There are two important parts to the results; the behavior of the individual stock return series and the behavior of the market in aggregate. These two parts will be discussed separately.

**INDIVIDUAL STOCK RETURN SERIES** As Levy remarked in his paper (1967), auto-correlation tests suffer from the defect that it is very difficult to determine what is the size of correlation coefficient which can be deemed to show a significant degree of dependence in the price series. The classical test of the degree of dependence hinges on the assumption of normality which may not be tenable in this instant. In addition therefore, the preponderance of correlation coefficient in the same direction for each lag is also considered. A situation in which the correlation coefficients are evenly spread with a few stocks demonstrating a high correlation coefficient is probably less indicative of non-random behavior than a situation in which a large majority of stocks tested demonstrating tightly packed correlation coefficients. For this reason, both the number of cases which has a correlation coefficient which is greater than twice its standard errors, the frequency distribution of the correlation coefficient and the number of stocks which have a positive correlation coefficient are provided in Table 7.2.1A.

On an absolute basis, we can say that the weekly return relatives show little serial correlation over the whole spectrum of time lags tested. Even among the lags which demonstrate the greatest degree of dependence (i.e. those selected for Table 7.1), the average number of cases per lag which has a correlation coefficient which is greater than twice their respective standard error is only 5.5 and the maximum is only 8. In terms of the actual value of coefficients, in only three cases do more than 10% of the stocks show a correlation coefficient of greater than 0.10. There are only weak indications of dependence surrounding the traditional technicians' nodes of 4, 8, 13, 26, 52 (actually strongest at around 50 weeks) and 208 weeks.

Compared with Fama (1970) who tested the autocorrelation over 1, 4, 9

TABLE 7.2.1

SUMMARY OF THE AUTO-CORRELATION TESTS ON WEEKLY RETURN  
RELATIVES DISTRIBUTION OF THE CORRELATION COEFFICIENTS

(A) FREQUENCY DISTRIBUTION OF THE CORRELATION COEFFICIENTS

LAG IN WEEKS	FREQUENCY DISTRIBUTION OF THE CORR. COEFFICIENTS					>0.10
	<-0.10	-0.099/ -0.05	-0.049- -0.001	0/ 0.049	0.05/ 0.099	
1	10	11	17	24	11	4
2	2	8	17	28	15	7
3	1	2	17	26	22	9
4	0	2	19	36	19	1
7	2	14	28	18	8	1
8	0	2	22	34	14	5
9	2	7	35	23	7	3
10	2	18	30	22	5	0
11	0	14	30	31	2	0
12	2	16	42	16	1	0
13	4	16	39	16	2	0
14	0	6	41	25	4	0
26	3	9	38	23	4	0
50	1	3	22	28	16	4

TABLE 7.2.1(contd)

## (B) OTHER RESULTS OF AUTOCORRELATION TESTS

LAG IN WEEKS	STANDARD ERROR	NO OF CASES > 2 X SE	NO OF +VE r	C.COEFF FOR MKT RETURN
1	.0950	4	39	0.1796*
2	.0569	4	50	0.1058*
3	.0589	8	57	0.1284*
4	.0400	7	56	0.0926*
7	.0459	4	27	-0.0269
8	.0432	8	53	0.0962*
9	.0452	6	33	-0.0106
10	.0424	3	27	-0.0598
11	.0390	6	33	-0.0419
12	.0359	6	17	-0.0484
13	.0397	7	18	-0.0776
14	.0306	4	29	-0.0476
26	.0392	5	27	-0.0827*
50	.0559	3	48	0.0970*

\*Corr. coefficient of market return exceeds 2X its Standard Error.

and 16 days, the current series of test show very similar result. Taking the 9 and 16 day auto-correlation as the closest to 1 and 2 week auto-correlations performed here, the percentages of cases which demonstrate a correlation coefficient of greater than two times standard error are respectively 5.1% and 5.1% as against 6.7% and 3.3% in Fama's case.

When all the stock returns are considered together, there is slightly stronger evidence in support of the belief that stocks show periodic movements. There is some evidence of non-randomness at lags of 4 weeks, 8 weeks, 27 weeks and 50 weeks. The positive cycle of 8 weeks is particularly interesting since it is bracketed by weeks with minimal appearance of non-randomness. While there is no logical economic explanation on why stock return series should demonstrate such non-random behavior, to a weak extent, the evidence lends support to the "random walk with reflecting barrier" type of stock behavior proposed by Cootner.

**OVERALL BEHAVIOR OF THE MARKET** The results on the overall market behavior provide more interesting reading. They show fairly clearly at what lags are at which a great majority of the stock return series to show some tendency to move together. Based on the market return, it would appear that there is some tendency for stocks to move together over 1 to 4 weeks (correlation coefficient respectively 0.1796, 0.1058, 0.1284 and 0.0926 all of which exceed two times the standard error). Over the longer term, there appears some tendency for stock returns to move together at 8, 26 and 50 weeks lag (correlation coefficient respectively 0.0926, -.0827 and 0.0970 all of which again exceed two times the standard error).

#### (B) THE MONTHLY RETURN SERIES

The auto-correlation tests performed on the weekly return relatives do not produce strong evidence in support of non-randomness. A possible reason is that the weekly returns may be too fine a measure to examine human activities. It is doubtful that cycles in the stockmarket occur at very precise intervals. This statement would seem to be even more applicable when the very long cycles are considered. Thus when Rozeff and Kinney (1976) tested for the yearly cycle, they used monthly return instead of weekly return. It is therefore decided to replicate the tests using monthly return relatives.

In all 42 runs of the autocorrelation tests are performed on each of the 79 return series. Again, the results are too voluminous to be reproduced fully here and they are summarised as Table 7.2.2 which is shown below.

The second series of tests produce more interesting results. Using monthly returns, it appears that the stockmarket does have a more significant tendency to cyclical movements surrounding the nodal points of one month, one quarter and one year. The significance of such cyclicalities will be discussed separately under each of these lags. The degree of non-independence obtained will be compared with those obtained by Rozeff and Kinney.

**MONTHLY CYCLE** There appears to be some evidence in support of the contention that there exists a cycle of between four and six weeks in length for some of the Malaysian stocks. Between 52 to 58 out of 78 stocks have positive auto-correlation coefficient and between 6 to 13 of these stocks exhibits a correlation coefficient which is twice greater their standard errors. However, this tendency rapidly dissipates as the differencing interval increases further such that with an lag interval of 8 weeks, there are only 3 stocks out of 78 which exhibit a correlation coefficient which is greater than two times standard error. This appears to imply that there is some tendency for the return of two consecutive months to be correlated.

Rozeff and Kinney found a similar tendency for market returns in their test. Of the six sub-samples tested, four show a correlation coefficient which is greater than two times their standard errors and the other two show correlations which are just on the verge of being significant. The current test shows an even greater tendency to a monthly cycle in market return (correlation coefficient being 0.233) than the sample tested by Rozeff and Kinney (average of about 0.19).

**QUARTERLY CYCLE** At the differencing interval of 12 weeks, there again exists some tendency for auto-correlation, although such correlation is largely negative. For the lag intervals of 11, 12 and 13 weeks, the respective number of stocks which exhibits positive correlation coefficient is only 14, 9 and 11. The number of stocks which exhibit correlation coefficient which is twice larger than its standard error are respectively 6, 10 and 6. Thus there appears to be some tendency for stocks to show a degree of price reversal at

TABLE 7.2.2

SUMMARY OF THE AUTO-CORRELATION TESTS ON MONTHLY RETURN  
RELATIVES DISTRIBUTION OF THE CORRELATION COEFFICIENTS

## (A) FREQUENCY DISTRIBUTION OF THE CORRELATION COEFFICIENTS

LAG IN WEEKS	FREQUENCY DISTRIBUTION OF THE CORR. COEFFICIENTS					
	<-0.10	-0.099/ -0.05	-0.049/ -0.001	0/ 0.049	0.05/ 0.099	>0.10
4	6	5	8	14	11	33
5	1	3	14	16	17	26
6	2	4	19	28	10	14
7	3	9	17	31	11	6
8	3	12	21	24	12	5
9	5	19	30	11	8	4
10	12	28	14	14	6	3
11	19	23	21	7	6	1
12	23	23	20	7	3	1
13	21	21	22	9	2	2
14	11	19	24	16	6	1
15	11	9	25	19	10	3
24	2	14	20	21	16	4
25	7	22	20	14	13	1
26	9	23	19	16	9	1
27	6	27	23	13	6	2
50	2	2	13	25	13	22
51	2	8	8	21	18	20
52	4	8	12	23	18	12
53	5	9	22	23	13	4
54	6	13	25	22	7	3
55	8	21	24	5	15	3
56	13	27	24	7	3	3
204	7	18	28	17	5	2
205	11	17	24	17	7	1
206	9	19	21	24	3	1
207	5	15	20	32	5	0
210	0	8	20	26	16	7
211	1	6	20	24	20	6
212	3	5	17	29	16	7
213	5	4	22	27	13	6
214	3	10	27	23	9	5
215	6	19	19	23	7	3
216	5	15	30	22	3	2



TABLE 7.2.2(contd)

## (B) OTHER RESULTS OF THE AUTOCORRELATION TESTS

LAG IN WEEKS	STANDARD ERROR	NO OF CASES > 2 X SE	NO OF +VE r	C.COEFF FOR MKT RETURN
4	.0974	6	58	0.2330*
5	.0763	13	59	0.1676*
6	.0658	9	52	0.0973
7	.0629	6	48	0.0480
8	.0618	3	41	0.0233
9	.0671	5	23	-0.0269
10	.0721	4	23	-0.0698
11	.0703	6	14	-0.1068
12	.0703	10	11	-0.1357
13	.0691	6	13	-0.1226
14	.0684	8	23	-0.0898
15	.0704	5	32	-0.0518
24	.0606	1	41	-0.0319
25	.0616	3	28	-0.0800
26	.0640	3	26	-0.1072
27	.0587	4	21	-0.1008
50	.0774	7	60	0.1120
51	.0707	6	59	0.0838
52	.0692	3	53	0.0462
53	.0615	2	40	-0.0003
54	.0596	4	32	-0.0294
55	.0613	6	23	-0.0549
56	.0627	8	13	-0.0934
204	.0617	5	24	-0.0608
205	.0592	8	25	-0.0771
206	.0542	6	28	-0.0677
207	.0590	3	37	-0.0452
210	.0621	1	49	0.0599
211	.0637	4	50	0.0760
212	.0618	4	52	0.0623
213	.0610	4	46	0.0420
214	.0638	5	37	0.0235
215	.0604	6	33	-0.0011
216	.0543	6	27	-0.0101

\*Corr. coefficient exceeds 2X its standard error.

three monthly interval. This lends a small amount of support for the technicians' belief that stocks tend to show a "secondary cycle" of between 6 weeks and 6 months.

On an aggregative basis, Rozeff and Kinney's test show similar tendency to negative auto-correlation at 12 week lag. The value of the correlation coefficient of the current test is again larger than that of Rozeff and Kinney's (  $-0.1357$  against about  $-0.11$  ).

**ONE-YEAR CYCLE** There appears to be two different cycles surrounding the one year node. There is a positive cycle of 50-51 weeks in length and a negative cycle of about 56 weeks in length. The 50/51 week cycle appears to be the stronger one. The number of stocks showing positive correlation for the lag intervals of 50, 51 and 52 weeks is respectively 60, 59 and 53 with the number of stocks exhibiting correlation coefficient which is greater than twice its standard error is respectively 7, 6 and 3. This evidence of cyclicity seems to lend some support to the traditional Malaysian stockmarket "folklore" that the stockmarket tends to rise around the time of the Chinese New Year. The Chinese New Year is based on the lunar year of about 50.5 weeks with a "leap year" of 55 weeks every three years to keep the calendar in step with the Gregorian year. The existence of such a cycle would be in line with the "turn-of-the-year effect" of the Western markets which is now well tested.

There is unlikely to be any economic reason for the existence of such a cycle and it would be entirely possible that this is the end result of the "self-fulfilling" effect of such a folklore. While it would be risky to read too much into such tenuous evidence, it would be logical to conjecture that since the cycle is not based on anything rational, the knowledgeable investors may take advantage of such a cycle and sell part of their investments. If this conjecture is correct, one would expect that the positive correlation at a lag interval of about 51 weeks would quickly turn negative. The result of the tests shows that this is indeed so. At 56 week lag interval, the highly positive preponderance of the correlation coefficients has turned highly negative (only 13 out of 78 stocks exhibit positive correlation coefficients).

On an aggregative basis, the market shows some tendency to non-randomness at 50/51 weeks interval although such non-randomness

is not significant (correlation coefficient being respectively 0.1120 and 0.0838; standard error being about 0.08).

**FOUR-YEARLY CYCLE** There is only weak evidence of any cyclicity surrounding the four year node. There is some indication of a negative cycle of slightly less than 208 weeks in length and a positive cycle which is slightly longer than 208 weeks in length.

#### 7.2.4 - CONCLUSION

Based on these very comprehensive tests carried out on a large sample of Malaysian stocks covering 16 years, it is possible to state that there appears to be somewhat more serial dependence in Malaysian stock prices than in the Western cases. The amount of dependence in the individual weekly return relative series is low and is in line with what was obtained by Fama in a similar series of tests although the two are not strictly comparable because Fama used daily prices and different lags.

The monthly return relative series however demonstrate a greater degree of dependence than the weekly return series. It is notable that Rozeff and Kinney were able to show conclusive signs of serial dependence of one year's lag using non-parametric tests although the standard auto-correlation tests did not show significant amount of dependence.

At this stage, it is not possible to state whether such dependence can lead to a situation wherein traders can make actual abnormal profit. Some degree of dependence appears to exist in a number of stocks, dependence which is consistent and statistically significant. It is therefore not unreasonable to conclude that the Malaysian stockmarket does not exhibit perfect efficiency in terms of stock price periodicity information. It is conceivable that knowledgeable investors can possibly make abnormal profit although there is little evidence to support this at this stage. As will be shown later in the Relative Strength tests, there appears to be a small potential for making abnormal profit in the Malaysian stockmarket because of the existence of some degree of regular cyclicity.

## 7.3 - Uncovering Long Term Trend Using Moving Average Tests

### 7.3.1 - BACKGROUND TO THE TESTS

The previous test is designed to uncover the existence of cyclicalities over a wide range of timespans. These series of tests are designed to isolate the effect of medium term or "secondary" cycles in order to reveal the long term or "primary" cycles. There is another material difference between the first series of tests and the present one. A serial correlation test can only uncover any periodicity if such periodicity is reasonably regular. The moving average test is designed to uncover irregular cycles, provided that such cycles are longer than the length of the moving average and that the amplitude of the cycle is adequately large.

These series of tests are based on the well known technicians' belief (as described in Edwards and Magee (1966)) that stock prices exhibit so-called secondary movements of between six weeks and six months when its price would move between a pair of trend lines. Such secondary movements can continue for a period of between one to three years which in turn form the primary movement. By using price charts and other manifestations of price movements, technicians hope to be able to identify the beginning of such primary movements. By buying shortly after the start of the primary bull trend and selling shortly after the start of the primary bear trend, the technicians hope to gain abnormally large profit.

Owing to the fact that the number of cycles per primary movement is not definite, nor is the size of the upward movement or the length of the primary movement known, it is therefore difficult to design a test to replicate exactly the practitioners' method. Filter tests, originally designed by Alexander (1961) are now thought to be unsuitable for this purpose because of non-stationarities of stock prices.

The methodology of the moving average tests was first suggested and tested by Cootner (1962) and later extensively tested by Van Horne and Parker (1967). The idea behind the use of moving averages is that a moving average of adequate length would smooth out even the longest

known secondary cycles and thus reveal the primary cycle. The use of a high enough hurdle rate would separate a "real" upward trend from minor movements. However, both the hurdle rate and the moving average length have to be chosen with care to ensure that the test conforms to the nature of the market. The very extensive series of tests conducted by Van Horne and Parker (with 20, 30 and 40 week moving averages and 0, 2.5, 5, 7.5, 10, 15% hurdle rates) led the authors to conclude that in so far as it was possible to design workable tests, the American market showed no exploitable primary cycles.

### 7.3.2 - METHOD AND SAMPLE

The moving average test has been previously described in detail in Chapter Three and there is hence no need to go into a detailed description here. While it is desirable to replicate Van Horne and Parker's methodology as closely as possible, it is felt that certain improvements can be made in the choice of combination of moving average lengths and hurdle rates. In selecting the lengths of moving average and hurdle rates to use, we can be guided by both practitioners' method and previously conducted tests. In terms of lengths of moving average to use, previous tests seem to be at slight odds with the practitioners' method (as stated by Edwards and Magee). If, as technicians suggest, the secondary movements are thought to be between 6-26 weeks in length, a 26 week moving average would seem to be about the longest that ought to be used. This is further confirmed by the fact that the most frequently quoted moving averages in charting publications (as in the S & P Trendline) is the 200-day (28.5-week) and the 30-week moving averages. Whilst Van Horne and Parker did not discuss the reasons for the chosen lengths, it is possible their choice is partly determined by this knowledge and they decided to bracket 30 weeks by 10 weeks on both sides. Cootner chose to use a single 40 week moving average. This study chooses to use 10, 15, 20, 25 and 30 weeks or lengths which are somewhat shorter than those previously tested. In terms of hurdle rates, we cannot be so clearly guided by practitioners' method as the margin by which the price should move above the previous trend is always stated in qualitative terms. In this case, we can be guided by previous tests. Previous tests seem to indicate that a hurdle rate of 7.5% produced the highest abnormal return. This series of tests will therefore use this hurdle rate bracketed by 5% and 10%.

The test consists of comparing the after tax return obtainable from \$1.00 invested in each of the sampled stock under both the "buy-and-hold" strategy and under the trading strategy using the moving average concept for the whole length of the research period. The return under the buy-and-hold strategy is computed from the logarithm of the total weekly return relative assuming continuous compounding. Under each test of the trading strategy, the weekly closing price of each stock is continuously compared with its own moving average and if the weekly closing price is above or below the moving average by greater than the hurdle rate for two consecutive weeks, the stock is then assumed to be bought or sold at the following week's closing price. During the time when the money is held as stock, the total return for the holding period is computed in the same way as under the buy-and-hold strategy. When the money is out of the stock, it is assumed to be held in a 7-day call money account at an after tax interest rate of 3.5% per annum (it will be explained later why this avenue of investment is chosen). A brokerage charge of 1% is assumed to be incurred each time the money is switched between stock and call-money and vice versa. It is realised that a 1% brokerage charge seems low by Western standard; however, the official broker's commission rate (set by the Exchange) in Malaysia is 1% and frequent traders can usually get a discount from this rate. Furthermore, the delivery time for share certificates is usually very long by Western standard because paperwork is as yet uncomputerised (a period of one month or more is quite normal, especially during market rises). No cost is assumed at this stage for price spread as it is an unknown quantity. If it turns out that the moving average strategy is superior than "buy-and-hold" method, sensitivity tests can be carried out at the time of examining this superiority.

The paired returns from each stock over the research period from the buy-and-hold and the trading strategy are then compared. If any of the trading methods is obviously superior to the buy-and-hold strategy overall, Wilcoxon signed rank tests will be used to examine the significance of such superiority. The null hypothesis is that the trading strategy should not yield higher overall return than the buy-and-hold strategy after transaction cost has been taken into account.

Minor modifications to the accepted methodology are necessary in order to take into account the different characteristics of the Malaysian market. Firstly, it would have been noticed that short



selling is not undertaken because it is currently against the Exchange rules. During the time when the moving average indicates a "no stock" situation, the money freed from selling the stock is assumed to be placed in a 7-day call money account to receive short term interest. The reason for using 7-day call money account instead of placing the money in Treasury Bills is that there is no secondary market for Treasury Bills in Malaysia. The after tax return of 3.5% seems very low by current Western market standards. However it must be noted that in Malaysia interest rate is under government control (both by the fact that the government owns the two largest banks in operation and the fact that the Central Bank offers virtually unlimited rediscount facilities for commercial papers to the clearing banks). During the research period the pretax 7-day call money rate only rose from 5% to 8% inspite of the global financial situation. (During the same period, the interest rate on personal saving accounts was comparable to the 7-day call money rate.) For this test, it is assumed to be 3.5% after tax throughout (Malaysian corporate tax rate is 40 + 5%, the extra 5% being a "temporary" surtax). Third, the Malaysian stockmarket is considerably more volatile than Western markets as has been shown in Chapter Two. A movement of 10% in the price of a stock in a single week is regularly met. For this reason, it is decided to use two consecutive weeks of movement greater than the hurdle rate to determine a "buy" or "sell" situation, the second breaching of the hurdle rate being taken as a confirmation of the previous week's movement. This modification has the effect of lengthening the lag by a week.

The sample selected for the performing of this test also reflects the nature of the companies in the database and the nature of the market. Owing to the fact that one of the requirements of sample selection is stratification by market sectors, some of the companies included in the database are infrequently traded. Infrequent trading results in spurious computed moving averages as well as very large jumps in prices. The moving average test is probably not usefully testable under such circumstances. It is therefore thought that it would be better to exclude those companies which are deemed to be infrequently traded (as defined in Chapter Six). Since almost all the infrequently traded companies are found within the Tin and the Hotel sectors, a perhaps arbitrary decision is taken to exclude all stocks within these two sectors. It is also thought that companies with a trading history of less than six years should be excluded because of inadequate data. This leaves a total sample of 58 which is an

## 7.3.3 - RESULTS OF THE MOVING AVERAGE TESTS

The results of the moving average tests are summarised in Table 7.3.1 and Table 7.3.2 below.

TABLE 7.3.1

## SUMMARY OF THE MOVING AVERAGE TESTS - LONG ONLY

		NO OF CASES IN WHICH AT LEAST ONE MA METHOD PRODUCES SUPERIOR RETURN		
LENGTH OF MOVING AVG WK.	HURDLE RATE	FIRST HALF 1968-1975	SECOND HALF 1976-1983	OVERALL 1968-1983
10	0.05	28	9	11
10	0.075	30	8	10
10	0.10	25	6	8
15	0.05	29	9	9
15	0.075	27	9	12
15	0.10	28	7	15
20	0.05	33	9	13
20	0.075	27	7	17
20	0.10	20	6	14
25	0.05	25	10	16
25	0.075	28	9	16
25	0.10	24	8	12
30	0.05	19	8	10
30	0.075	20	7	12
30	0.10	19	12	10
NO. OF STOCKS IN WHICH BUY-AND-HOLD IS SUPERIOR TO ALL MA METHODS		14	34	29
TOTAL NUMBER OF STOCKS		58	58	58

TABLE 7.3.2

COMPARATIVE RETURN FROM TRADING METHODS AND BUY-AND HOLD -  
CLOSING BALANCE FROM A STARTING SUM OF \$100 INVESTED IN EACH STOCK

MOVING AVG WK	HURDLE RATE	FIRST HALF	SECOND HALF
10	0.05	197.79	353.98
10	0.075	196.03	348.65
10	0.10	186.25	323.66
15	0.05	192.89	331.38
15	0.075	190.25	382.38
15	0.10	193.03	344.71
20	0.05	206.17	374.60
20	0.075	208.33	363.98
20	0.10	195.45	358.67
25	0.05	201.23	349.46
25	0.075	193.95	360.44
25	0.10	183.93	379.85
30	0.05	161.20	392.31
30	0.075	168.54	377.24
30	0.10	162.45	408.84
BUY-AND-HOLD STRATEGY		206.57	608.06

The major findings of the tests as evidenced from the above tables may be summarised as follows:-

(1) During the first half of the research period, the MA method performs slightly less well than the buy-and-hold method in the majority of methods tried. None of the trading methods is significantly superior to buy-and-hold. The buy-and-hold strategy is only significantly better (using Wilcoxon signed rank test) than the trading method with a moving average of 30 weeks.

(2) The buy-and-hold strategy is very much more superior during the second half of the research period than the first. During the second half of the research period, the buy-and-hold strategy is superior to all the MA methods at better than 0.025 level of significance. The difference in the relative performance of buy-and-hold during the separate halves of the research period is so great that it probably

cannot be attributable to chance. There are perhaps some environmental reasons for this superiority.

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(3) The consistency of performance of the various moving average methods is very surprising. During the first half, for nine of the fifteen methods tested, the strategy produces superior results within the range of 25 to 30 cases. In terms of closing balance, all but three of the trading methods produce an ending balance that is within 10% of the others (and within 10% of the buy-and-hold closing balance as well).

During the second half, all but one of the trading methods produce a closing balance that is within 15% of each others with the last within 25%. The number of superior cases for all methods falls within 6 and 12.

(4) There are indications that as the length of the moving average gets longer, its efficacy declines. There are also indications that both 0.05 and 0.075 are superior hurdle rates to 0.10.

#### 7.3.3.1 - DISCUSSIONS AND CONCLUSIONS

##### (A) COMPARISONS WITH VAN HORNE AND PARKER (1967)

There are several differences between the sample design and methodology between Van Horne and Parker (1967) (VP) and the current series of tests. VP used a sample of 30 stocks over a period of six and half years and tested moving average lengths of between 20 and 40 weeks. These tests employ a sample that is twice as large and cover a period that is two and half times longer and test moving average lengths of between 10 to 30 weeks. The differences in findings may or may not be a result of these differences.

Firstly, VP found an overwhelming advantage with the buy-and-hold strategy. Two indications of the superiority of buy-and-hold can be seen from the following findings:-

(a) For the 450 possible combinations of trading rules and stocks (15 X 30), the trading strategy is superior in only 69 cases;

(b) None of the trading rules produces a closing balance that is

within 20% of the buy-and-hold closing balance before transaction costs are taken into consideration (25% if transaction costs are included).

The current series of tests produce very interesting results in that for the second half of the research period, buy-and-hold is as overwhelmingly superior as in VP. Of the 870 possible combinations of trading rules and stocks (15 X 58), the moving average strategy produces only 123 superior closing balances. However, for the first half of the research period, the superiority is not so obvious. The trading strategy produces 382(out of 870) cases of higher closing balances. Furthermore, while VP found that in only three cases (10% of sample), did half or more (i.e. 8 or more out of 15) of the trading methods exceed the buy-and-hold method in profitability; in the current series of test, 23 do (40% of sample). Although the buy-and-hold strategy is also superior during the first half of the research period, the advantage is much less clear cut.

Secondly, VP found a slight superiority for the 40 week moving average out of the 20, 30 and 40 week moving averages tested. This series of tests however find that the 10 or 15 week moving average is slightly superior to the others (out of the 10,15,20,25 and 30 week moving averages tested) and that there are indications that as the length of the moving average increases, its efficacy declines during the first half. For the second half, both 15 and 30 week moving averages are relatively superior. The superiority of the latter is probably due to the fact that the longer moving averages used result in lesser trading and during this period, the less trading there is, the better would be the return.

#### (B) A POSSIBLE EXPLANATION FOR THE RELATIVELY BETTER PERFORMANCE OF THE TRADING STRATEGY DURING THE FIRST HALF OF THE RESEARCH PERIOD

The advantage in employing a trading strategy as against simply buying and holding lies in the supposed ability to be able to make a bigger gain by cycling between buying at a low point and selling at a high point such that the total return would be greater than merely buying and holding. However, there is an opportunity cost involved in not being able to sell at the top or buying at the bottom owing to the lag introduced by using moving averages and traders also have to pay for the transaction costs involved in trading. The longer the moving average, the greater is the lag, hence the larger the opportunity

cost. But the longer the moving average, the lesser is the turnover rate hence resulting in lower transaction costs. Insofar as it is possible to have an optimum length of moving average, one can envisage the type of market in which this trading strategy would excel. Such a market would be one with zero or low long term gain (assuming that there is no stockmarket which experiences a long term loss) with cycles of regular length which is the same as the length of the moving average being tested and large amplitude of movements.

On the other hand, there are several conditions which would reduce or negate the advantage of the trading strategy. If the market has a strong rising trend, the "sell" point would not be well above the "buy" point (that is the "up" legs of the stock price movement are much longer and/or steeper than the "down" legs) such that transaction costs and opportunity costs more than wipe out the gain obtained from trading. If the cycles are very short, the trading strategy would suffer from both excessive lags which results from high opportunity costs as well as missing out some of the cycles altogether. If the amplitude of movements is small (caused by either small market movements or low beta), the costs of transaction (together with the opportunity costs) would be greater than the possible gain from trading.

It is therefore conceivable that during certain periods of a market's existence, a trading strategy based on moving average could perform much better than at other times. It so happens that market conditions during the period chosen by VP for their tests are precisely opposite to those cited earlier as necessary conditions for superior performance of trading strategy. For five and a half years out of six and a half years' duration of the test, the market was rising rapidly with minor downturns. Between January 1960 and June 1966 (duration of the test), the Dow Jones Industrial Averages rose from about 650 to to 900. It would be useful if the same tests can be carried out for the period 1967-1980. For during this period, the overall market rose very little and there were several cycles of very large amplitude.

The very different performance of the same trading strategy uncovered by the present research during the two halves of the research period can perhaps be explained by the fact that the market was very different during the two separate halves of the research period.



During the first half of the research period, the market experienced two large downturns (respectively caused by race riots in 1969 and the OPEC induced recession of 1973/4) while during the second half, it only experienced a downturn of medium severity. The average annual gain for the market portfolio (computed using geometric mean) for the first half of the period is 15.5% as against 22.9% during the second half. These two factors probably contribute a large extent to the very poor performance of the trading strategy.

Further evidence in support of the above conjecture can also be gleaned from a study of the return characteristics of stocks which perform relatively well or badly under the trading strategy during the first half. Table 7.3.3 and Table 7.3.4 appended to the end of this section provide information on the return and beta of stocks which respectively perform well and badly under the trading strategy. Here the term "perform well" is defined as stocks which provide superior return to buy-and-hold in 8 or more (out of 15) of the MA methods while "perform badly" is defined as stocks which provide superior return in 3 or less of the MA method tested. (Owing the consistency of performance under MA method, very often the trading strategy would prove to be superior in all 15 methods).

As can be seen from Table 7.3.3, a majority (18 out of 23) of the stocks which provide superior performance under the trading strategy have relatively high beta or low return or both. And contrarily, a majority (20 out of 23) of the stocks which perform badly under the trading strategy have relatively low beta or high return or both. There are of course some exceptions to the rule but they form a small minority. The summary information from Tables 7.3.3 and 7.3.4 is provided below:-

	AVG BETA	AVG LOG RETURN
MEDIAN OF MA SUPERIOR STOCKS	1.006	0.1164
MEDIAN OF MA INFERIOR STOCKS	0.810	0.1813
MARKET MEAN DURING 1968-1975	0.903	0.1441

#### 7.3.4 - CONCLUSION

Based on this series of tests together with the tests carried out by Van Horne and Parker, it is possible to draw the following tentative conclusions regarding Moving Average trading methods.

(1) It does not appear possible to obtain consistent superior return over a long period of time in the Malaysian market by using moving average trading methods compared with a simple buy-and-hold strategy;

(2) There are indications that the returns obtainable under moving average methods are very sensitive to the market conditions and/or stock characteristics. If the conditions are right, the moving average method can produce superior result. While it is not possible to predict the future market conditions, stock characteristics are predictable to a certain extent. Thus the beta of a stock is reasonably predictable as is the growth rate of an industrial sector.

(3) While it is not possible to show in a scientifically rigorous way that the moving method is in any way superior, at the same time, it would be premature also to conclude that the MA method is totally worthless as an investment strategy for all stocks and at all times. This series of tests have shown that there can be considerable deviations from the picture of perfect efficiency to cast doubt on the strong conclusion reached by VP.

TABLE 7.3.3

CHARACTERISTICS OF STOCKS WHICH PERFORMED WELL UNDER THE MA METHODS  
1968-1975

STOCK	SUPERIORITY - OUT OF 15	AVG.BETA	AVG.LOG.RETURN
BDR	15	1.169	0.0021
CBL	15	1.007	0.0501
CCM*	10	0.802	0.1489
CNC	15	1.247	0.1366
CSB	13	0.979	-0.1209
CSC*	14	0.805	0.2094
DBS	14	1.402	0.1164
DMI*	8	0.755	0.2025
ESS	11	0.752	0.0250
FNN	12	0.980	0.0743
GTH	9	1.047	0.0901
HWP	15	1.186	0.1380
KEM	14	1.009	0.1694
KLK	9	1.047	0.0901
MAG*	11	0.810	0.1969
MUI	15	1.337	-0.0350
NBT*	10	0.496	0.1651
RTH	11	0.899	0.0754
SCN	15	0.268	0.0471
TAN	15	1.184	-0.2599
UOB	9	1.409	0.3979
UOL	8	1.135	0.1601
WEA	12	1.006	0.1441
MEAN	12.17	0.966	0.0927
MEDIAN	12	1.006	0.1164
MARKET MEAN		0.903	0.1441

\* = EXCEPTIONAL STOCKS. THAT IS, STOCKS WHICH HAVE BOTH BETA <0.903  
AND RETURN >0.1441.

TABLE 7.3.4

CHARACTERISTICS OF STOCKS WHICH PERFORM BADLY UNDER THE MA METHODS  
1968-1975

STOCKS	SUPERIORITY - OUT OF 15	AVG. BETA	AVG. LOG. RETURN
BTD	0	0.5786	0.3211
CON	3	0.7476	-0.0193
CPL	3	1.1982	0.0630
CTD*	0	1.1388	0.1377
FMB	0	0.7856	0.3526
GEN	3	1.2269	0.3526
GNS	0	0.7806	0.1178
HLO	1	0.3176	0.0499
HUF	0	0.6475	0.1990
HUM	1	0.7496	0.1578
IRN	1	0.9800	0.1583
KWN	0	0.4728	0.2480
MBB	0	0.8104	0.2550
MBS	3	0.6887	0.1234
MTC	0	0.8083	0.1247
OCB	0	1.1287	0.3931
ORL	0	0.8353	0.1963
SPR*	2	1.0200	0.0348
SSS	0	1.0765	0.2103
TAS	1	0.7967	0.2170
TMB	0	0.9607	0.1866
TNC*	0	1.0381	-0.0327
UPL	0	0.6149	0.1813
MEAN	0.78	0.8436	0.1740
MEDIAN	0	0.8104	0.1813
MARKET MEAN		0.903	0.1441

\* = EXCEPTIONAL STOCKS. THAT IS, STOCKS WHICH HAVE BETA >0.903  
AND RETURN <0.1441

## 7.4 - Testing for the Validity of the Relative Strength concept <sup>240</sup>

### 7.4.1 - BACKGROUND TO THE TESTS

These series of tests are based on the well known technicians' belief (as stated by books such as Edwards and Magee (op cit)) that a stock that is moving up relatively faster than the market will tend to continue to do well and one which is moving down faster than the market will continue to do badly until such trends are somehow broken. The concept of "relative strength" is to be distinguished from the concept of market effect. A stock with low beta could show high relative strength at certain times and vice versa. The basis for such a belief is the idea that the market participants consist of investors with different degrees of knowledgeability. The price of a stock would start to move up relative to the market when the insiders and other highly knowledgeable investors begin to take interest in that stock because they know something which the general market does not as yet know. As the price moves up, it would attract the next most knowledgeable level of investors who in turn would push the price further up. One may term this the "jumping on the bandwagon effect". The mechanism involved is very much the same as that described in Chapter Four in connection with the paper by Akerlof (1970). The reverse takes place when the most knowledgeable investors receive a piece of bad news ahead of the market. It is also possible that the actions of the knowledgeable investors can have a cyclical effect on the price. The price movement triggered off by the buying of the superior investors could lead the price to move far out of line from its perceived "intrinsic value". If it were to go too far out of line, the knowledgeable investors would sell which can have an "avalanche" effect leading to the price falling well below its "intrinsic value" once again (as described by Cootner (1962)).

Technicians believe that it is possible to discern the actions and intentions of these knowledgeable investors by the use of the relative strength technique. To make use of this technique, the technician needs to define two criteria:-

(1) The optimum length of time over which to measure the relative movement of the stock prices; and

(2) The exact meaning of the term "relatively strong" or "relatively weak" when comparing the price movements of different stocks in the market.

As is usual with literature on technical methods, these crucial criteria are not defined in the common books on technical analysis. In addition, the exact way by which the relative strength concept can be employed in actual practice is not described either. This led Levy (1967) to invent his own methodology for performing the test. The validity of Levy's methodology (to be replicated later by Jensen and Bennington (1970) (JB)) will be examined in the next section.

#### 7.4.2 - METHOD AND SAMPLE

Levy's methodology requires the purchasing of stocks into a portfolio, stocks which have performed relatively well. The portfolio is rebalanced periodically by adding new stocks which have performed relatively well since the previous selection and casting out stocks from the portfolio which have performed badly. The total return for the portfolio is computed for the duration of the study before and after transaction cost has been taken into account. The computation of the return is straightforward and is based on the assumption of an equal dollar investment in each of the stocks in the portfolio at the start and equal distribution of available funds (from the disposal of cast out stocks) among the new stocks at each rebalancing.

He defined stocks which "have performed relatively well" as stocks within a portfolio which possess the highest ratios of the current price to the 27-week price moving average. This method requires the setting of three parameters: the percentage of the ranked stocks to be selected (which he called "X"), the "cast out rank" (i.e. the ranking of the relative strength below which a stock is deemed to have lost its high relative strength status which he called "K") and the frequency of rebalancing. In the design of the methodology and the definition of the various parameters, Levy appeared to have introduced changes to the original concept of relative strength method as practised by the technicians. It is possible that these changes would have resulted in the tests conducted by Levy and JB being less powerful. These and other drawbacks of Levy's methodology will be discussed in the next section.



## 7.4.2.1 - MAJOR DRAWBACKS OF THE LEVY METHODOLOGY

## AND THE PROPOSED MODIFICATIONS FOR THE CURRENT TESTS

(1) Market Effect Not Explicitly Taken Into Account Literature on technical methods usually left unstated whether the relative volatility (i.e. beta) of the stocks ought to be taken into account when computing the relative strength of stocks. As a group, technicians are notoriously unscientific and it is perhaps worth noting that the relative strength concept predated the discovery of the market effect. Although both Levy and JB were aware of the market effect, they did not apply the tool for adjusting the market effect at the time of their tests.

JB overcame this problem by grouping the stocks into classes having similar betas ( into 29 classes of 200 stocks each). This is not practicable for the present project since there are too few stocks involved. In order to overcome the market effect, the "relative" performance of the stocks will be computed by taking into account the beta of the stocks.

A necessary follow-up modification to Levy's methodology would ensue from the decision to use beta for adjusting the market effect when computing the relative strength. The beta of the stocks selected for the current project is calculated from the total return of the stocks rather than from price changes alone as the beta is obtained by regressing the logarithm of the weekly total return relative of a stock upon the logarithm of the weekly return relative of the market portfolio. As a result, the relative strength of the stocks in the test sample has to be computed from the beta adjusted logarithm of the return relatives (i.e. the return relative residuals) rather than the price movements.

This means that Levy's method for computing the relative strength is not applicable. The current series of tests therefore compute relative strength by comparing the cumulative return residual of all the stocks in the sample over a period of time  $X$  ( where  $X = 4, 7, 10, 13$  and  $26$  weeks). Those stocks having the highest cumulative return residuals are deemed to have the highest relative strength and vice versa.

It is perhaps fortuitous that this modification is required because, as will be shown in the next two subsections, Levy's method may not be

a good approximation of the practitioners' method.

(2) Levy's Method Is Not Good Approximation Of The "Trading" Nature of the Practitioners' Method Apart from the previous defect, Levy's method also does not appear to take into account the fact that technicians' methods are usually thought of as short term trading methods. By buying the high relative strength stocks and holding them in a portfolio for long duration, the methods probably lessens the benefits to be gained (if there is any). As far as can be gathered from the literature, the typical technician operates with a high turnover of stocks under most of the methods employed. He would normally dispose of his stocks after a few months whether they provide a profit or not. Levy's method of holding on to the stocks unless they fall below the cast out rank would tend to produce a more "fuzzy" result.

Instead of tracking the performance of a portfolio which is continuously being built up with high relative strength stocks, it is therefore proposed to compare the performance of a high relative strength portfolio with that of a low relative strength portfolio for a period of 12 weeks after they have been selected. Thereafter a new pair of portfolios are selected. The period of 12 weeks is chosen because it is decided to test this method once every 13 weeks so as to obtain a large enough sample.

(3) Levy's "Relative Strength" Method Is Too Close to the Moving Average Method Levy's definition of high relative strength stocks results in a method of selecting stock which is almost identical to the method of stock selection under the "Moving Average" method previously discussed in Section 7.3 in terms of both the stock selection method and the time period over which the stocks are selected. The one difference is that under the Moving Average Method, the stocks are selected if the current price exceeds the medium term moving average by a certain percentage while Levy's Relative Strength method selects those stocks which have the highest ratios of current price to its medium term moving average. The previously proposed modification would differentiate this test from the Moving Average Test.

The last problem with Levy's method is that a 27-week moving average may cover too long a time frame. A review of literature on technical analysis shows that technicians usually speak of relative strength as

a short term method rather than long term. Indeed, a commercial charting publication, "The S&P Trendline" defines its selection of high relative strength stocks as those stocks which have shown the highest relative price movements in "recent weeks" (the term "recent weeks" is not defined). It is therefore proposed that the relative strength method is tested over a range of time period adopted from the technicians' belief of secondary cycles of between 6 weeks and 6 months. Test periods of 4, 7, 10, 13 and 26 weeks are selected for the current series of tests.

#### 7.4.2.2 - THE PROPOSED METHODOLOGY DESCRIBED

The proposed methodology stays close to the original concept of Levy apart from the three modifications proposed above. A single sample consisting of all the stocks in the database is used throughout the research period. The cumulative return residuals for the prior 4, 7, 10, 13 and 26 weeks for all the stocks in the sample are computed and ranked once every 13 weeks throughout the research period (which is 64 quarters long) except the last, making a total of 314  $\{(63 \times 4) + 62\}$  rankings. The high and low relative strength stocks are respectively defined as the top ranked and bottom ranked stocks in terms of their cumulative return residuals. Four portfolios are formed from each quarterly ranking; two from the highest and lowest ranked 15 stocks and two from the highest and lowest ranked 10 stocks (these are equivalent to a "X" of 15% and 20% in Levy's terminology). The low strength portfolios are called the "Class A" portfolios and the high strength portfolios, the "Class B" portfolios.

The total return residual of each portfolio is then tracked for a further 12 weeks after portfolio formation. The post portfolio formation collective return residuals from the two pairs of Class A and Class B portfolios for each quarter are compared using Wilcoxon Signed Rank Tests based on the Null Hypothesis that the two different portfolios should not produce a distinguishable difference in return residual. The transaction costs are not taken into account in the first place.

#### 7.4.3 - RESULTS AND DISCUSSIONS

The results of the various relative strength tests are provided in Tables 7.4.3 and 7.4.4 appended at the end of this section and the

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results are also summarised in Tables 7.4.1 and 7.4.2 below in a slightly different presentation. The main findings of the tests may be summarised as follows.

(1) It Appears Possible To Detect Some Non-Randomness In Malaysian Stock Prices Using The Relative Strength Method

The detectable non-randomness, however, is not as clearcut as it is traditionally held by technicians. That is, it does not appear possible to take advantage of the "jumping on the bandwagon" effect as described earlier in Section 7.4.1 and make abnormal gain by buying stocks which had performed relatively better. As can be seen from Table 7.4.3, in the cases of the 10-stock portfolios, of the five different time period relative strength methods tested, none of the Class B portfolios (high strength) outperform the Class A portfolios (low strength) throughout the 12 week period after portfolio formation on an overall basis.

In fact the opposite is true. In the case of portfolios of 10 stocks each, the "low strength" portfolios outperform the "high strength" portfolios in every instance. Out of the 20 instances of comparison (5 different relative strengths at 4, intervals after portfolios formation), only two of the Class A portfolios (low strength) do not significantly outperform the Class B portfolio. (The significance probability of each of the Wilcoxon signed rank tests is given in Tables 7.4.3 and 7.4.4 )

TABLE 7.4.1

AVERAGE PER STOCK ABNORMAL RETURN OF CLASS B (HIGH STRENGTH)  
PORTFOLIOS AFTER VARIOUS HOLDING PERIODS POST PORTFOLIO FORMATION

WK. AFTER FORMATION	PORT. SIZE	LENGTH OF RELATIVE STRENGTH					MEAN
		4 WEEK	7 WEEK	10 WEEK	13 WEEK	26 WEEK	
2	10	-.0068	-.0030	+.0159	-.0015	+.0022	-.0012
	15	-.0024	+.0007	-.0008	-.0003	+.0024	-.0001
4	10	-.0101	-.0080	-.0066	-.0061	-.0043	-.0070
	15	-.0070	-.0053	-.0055	-.0061	-.0034	-.0055
8	10	-.0192	-.0224	-.0189	-.0130	-.0150	-.0177
	15	-.0133	-.0173	-.0169	-.0140	-.0124	-.0148
12	10	-.0230	-.0308	-.0254	-.0202	-.0205	-.0240
	15	-.0155	-.0230	-.0187	-.0163	-.0179	-.0183

TABLE 7.4.2

AVERAGE PER STOCK ABNORMAL RETURN OF CLASS A (LOW STRENGTH)  
PORTFOLIO AFTER VARIOUS HOLDING PERIODS POST PORTFOLIO FORMATION

WK. AFTER FORMATION	PORT. SIZE	LENGTH OF RELATIVE STRENGTH					MEAN
		4 WEEK	7 WEEK	10 WEEK	13 WEEK	26 WEEK	
2	10	.0139	.0070	.0121	.0103	.0052	.0097
	15	.0109	.0060	.0085	.0070	.0033	.0070
4	10	.0109	.0068	.0152	.0097	.0059	.0097
	15	.0076	.0045	.0101	.0088	.0031	.0068
8	10	.0092	.0102	.0178	.0120	.0122	.0123
	15	.0072	.0079	.0133	.0086	.0070	.0088
12	10	.0130	.0129	.0207	.0131	.0156	.0151
	15	.0107	.0097	.0163	.0081	.0095	.0109

An interesting result of these tests is that in almost all the relative strength methods tested, abnormal return in the opposite direction to what is logically expected is obtained. An attempt will be made here to provide an explanation for this behavior.

An examination of a small sample of the portfolios selected reveals that there is a surprisingly fast turnover of stocks from portfolio of one length to the next. Typically, two adjacent portfolios (e.g. of 4-week and 7-week relative strengths) would have only about one third of their stocks in common. It is also noticeable that much of the abnormal return is contributed by the non-common stocks.

This result seems to imply that stocks are not subjected to cycles of similar lengths. It also appears that there is a strong tendency to auto-reverse at the top or bottom of their price cycles and that the downside of the price cycles are steeper than the upside. It would seem that the relative strength method used in this series of tests is adept at picking out stocks which have arrived at or are near to their turning points. The price reversals experienced by these stocks are strong enough to produce the observed result although in each ranking of the high and low length stocks only a smallish number of stocks are undergoing such reversals. The conjecture that only a smallish number of stocks are significantly involved in each test is given added strength by the next finding.

### (3) The 10 Stock Portfolios Outperform the 15 stock Portfolios

The tests carried out are replicated using two different sizes of portfolios - 10 and 15. The results of the two series of tests seem to indicate that a portfolio size of 10 has greater power to produce abnormal return. Table 7.4.1 above gives the average per stock abnormal return in respect of the Class B portfolios in the various weeks after portfolio formation. The abnormal returns in respect of the Class A portfolios (Table 7.4.2) show similar relative difference although in absolute terms, they are smaller.

As can be seen from the above tables, the 10-stock portfolios consistently produce higher per stock abnormal returns throughout the 12 week holding period. This supports the earlier conjecture that a smallish number of stocks account for much of the total amount of



abnormal gain detected.

(4) Maximum Abnormal Return Is Obtained After About 12 Weeks

It can be seen that generally, the abnormal return increases monotonically as the holding period is lengthened. Twelve weeks (which is the maximum period observed) provides the largest abnormal returns except in one instance (4-week relative strength method). However, there is some indication that the abnormal returns may be flattening by the 12th week.

(5) The Absolute Magnitude Of the Abnormal Price Movements Is Not Large

(In the ensuing discussion, only the case in respect of the abnormal return for the 10-stock portfolio at the end of 12 week holding period is considered as this is the case where the maximum abnormal returns (positive and negative) are obtained)

Although the abnormal returns obtained when the relative strength method is applied to Malaysian stocks appears to be highly significant in statistical term, the quanta of abnormal gain obtained are not large. As can be seen from Tables 7.4.1 and 7.4.2, the pattern of the abnormal movements is roughly the same across both Class A and Class B portfolios although the movements are in the opposite direction.

In respect of the Class A portfolios, the abnormal movements are positive and the return residuals increase to a maximum at the 12th week after portfolio formation. The maximum abnormal return obtained is from the use of the 10-week relative strength method which provides a gain of 2% after 12 weeks. The average magnitude of gain is 1.5% after 12 weeks which translates to an annualised gain of 6%.

In respect of the Class B portfolios, the abnormal movements are negative and similarly the return residuals increase in magnitude up to the 12th week after portfolio formation. The maximum abnormal returns are provided by the 7-week relative strength method which results in a loss of 3% after 12 weeks. The average magnitude of the loss experienced by all the portfolios is 2.4% after 12 weeks or an annualised loss of 10%.

Although the direction of the abnormal movements is the opposite to that detected by Jensen and Bennington (1970)(JB), it is interesting to compare the size of these abnormal movements with those obtained by JB. Using the  $[X = 10\%, K = 160]$  and the  $[X = 5\%, K = 140]$  methods, JB respectively obtained an average abnormal return of 1.3% and 0.8% on an annualised and before transaction cost basis. It would appear that the current test method can provide, at best, an average abnormal movement that is 4.6 times (going long on the Class A stocks) or 7.6 times (going short on the Class B stocks) than the best obtained by JB.

Based on the methodology used in these tests, it would appear that it is possible to make abnormal profit by trading stocks using the relative strength methods tested here. However, the absolute amount of gain which can be obtained by a trader is only about 4% on an annualised basis after taking into account his transaction cost (of about 2% per turnaround) even in the best case. This gain is obtainable only by shortselling which is not allowed under the existing KLSE rules. Therefore, while the statistical evidence of dependence is very strong, such statistical dependence may be less important from the real world trader's point of view. The problem here is that the method as tested is not refined enough to pick out only those stocks which have peaked or bottomed. And since different stocks conform to different cycles, the subsequent abnormal movement of the stocks which have peaked (or bottomed) is diluted by the stocks which are still on the their way up (or down). Under the real world conditions, a technical trader probably does not employ such a purely mechanical method. It may be feasible to design further modifications to bring the method closer to the real world. A possible refinement would be to combine this method with the information on stock periodicity obtained from the auto-correlation tests described in Section 7.2.. Thus, it may be possible to select stocks using the 10-week relative strength method in conjunction with the knowledge that certain stocks have a pronounced 20 week cycle.

#### (6) The Greatest Amount Of Abnormal Movements Appears To Be Related To A Price Cycle of About 20 Weeks

Although abnormal returns are obtained with almost all relative strength methods tested, such abnormal returns are not uniform for all combinations of relative strength lengths and holding periods. In the case of the Class B portfolios (high strength), the greatest abnormal

return is obtained using 7-week relative strength and the portfolio being held for 12 weeks. The second biggest abnormal return is obtained using 10-week relative strength and the portfolio held for 10 weeks. In the case of the Class A portfolios, the greatest abnormal return is obtained using 10-week relative strength portfolio held for 12 weeks with the second greatest abnormal return obtained using 10-week relative strength portfolio held for 10 weeks. This seems to imply that as far as could be deduced from the available data, the greatest amount of abnormal return is obtained from a cycle of around 20 weeks or longer. This conjecture ties in well with the results of the auto-correlation tests discussed in Section 7.2 wherein it was found that the 11 to 13 weeks auto-correlation showed the greatest degree of negative correlation.

#### 7.4.4 - CONCLUSION

The results of this series of tests together with the results from the auto-correlation tests seem to show that there is a certain degree of serial dependence in the prices of stocks in Malaysia. Certainly, there is a much greater degree of dependence than that of the US market as demonstrated by Fama (1970) or Jensen and Bennington (1970). Although the best relative strength method is capable of providing an after transaction cost abnormal gain of only about 1% every 12 weeks, the abnormal gain obtainable is very persistent and statistically very strong. As most academic workers are willing to admit, it is very difficult to duplicate exactly practitioner's methods. It is possible that with a greater degree of refinement, it is may be feasible to obtain a higher level of abnormal gain. From these series of tests, it would seem that the level of non-randomness in Malaysian stocks is higher than that of the larger of the Western markets. It would seem premature therefore to say that it is impossible for knowledgeable investors to make abnormal gain by using technical methods.

TABLE 7.4.3

SUMMARISED RESULTS OF THE 10-STOCK PORTFOLIO RELATIVE STRENGTH TESTS

REL.STRGTH METHOD	WEEKS AFTER PORT FORMTN	PORT. TYPE	AVE.CUM. RESIDUAL*	NO. SUPR'R	RANK SUM+	SIGNIFICANCE PROBABILITY~
FOUR WEEKS	2	A	.1389	42	-1420	<0.01
		B	-.0679	21	596	
	4	A	.1090	40	-1425	<0.01
		B	-.1005	23	591	
	8	A	.0924	39	-1413	<0.01
		B	-.1924	24	603	
	12	A	.1297	41	-1399	<0.01
		B	-.2295	22	617	
SEVEN WKS	2	A	.0787	38	-1194	0.102
		B	-.0298	25	822	
	4	A	.0677	36	-1265	<0.04
		B	-.0821	27	751	
	8	A	.1023	43	-1472	<0.01
		B	-.2241	20	544	
	12	A	.1290	44	-1498	<0.01
		B	-.3082	19	578	
TEN WEEKS	2	A	.1209	33	-1214	<0.08
		B	.1586	30	802	
	4	A	.1517	43	-1448	<0.01
		B	-.0655	20	568	
	8	A	.1783	44	-1559	<0.01
		B	-.1886	19	457	
	12	A	.2073	37	-1450	<0.01
		B	-.2527	26	566	
THIRTEEN WK	2	A	.1031	37	-1276	<0.04
		B	-.0146	26	740	
	4	A	.0974	41	-1349	<0.01
		B	-.0610	22	667	
	8	A	.1203	44	-1407	<0.01
		B	-.1295	19	609	
	12	A	.1307	41	-1409	<0.01
		B	-.2022	22	607	
TWNTY-SX WK	2	A	.0519	32	-991	NOT SIG.
		B	.0220	31	1025	
	4	A	.0593	39	-1254	<0.05
		B	-.0433	24	762	
	8	A	.1229	41	-1465	<0.01
		B	-.1502	22	551	
	12	A	.1564	43	-1469	<0.01
		B	-.2054	20	547	

TABLE 7.4.4

SUMMARISED RESULTS OF THE 15-STOCK PORTFOLIO RELATIVE STRENGTH TESTS

REL. STRGTH METHOD	WEEKS AFTER PORT FORMTN	PORT. TYPE	AVE.CUM. RESIDUAL*	NO. SUP	RANK SUM+	SIGNIFICANCE. PROBABILITY~
FOUR WKS	2	A	.1642	41	-1346	<0.02
		B	-.0370	22	670	
	4	A	.1144	43	-1316	<0.02
		B	-.1054	20	700	
	8	A	.1086	40	-1357	<0.01
		B	-.2003	23	659	
	12	A	.1603	39	-1380	<0.01
		B	-.2320	24	636	
SEVEN WKS	2	A	.0898	38	-1195	0.1003
		B	-.0370	25	821	
	4	A	.0672	32	-1214	<0.08
		B	-.0790	31	802	
	8	A	.1188	43	-1467	<0.01
		B	-.2589	20	549	
	12	A	.1461	42	-1503	<0.01
		B	-.3457	21	513	
TEN WEEKS	2	A	.1278	38	-1285	<0.04
		B	-.0119	25	731	
	4	A	.1520	44	-1397	<0.01
		B	-.0832	19	619	
	8	A	.1989	42	-1505	<0.01
		B	-.2542	21	511	
	12	A	.2439	39	-1431	<0.01
		B	-.2806	24	585	
THIRT'N WKS	2	A	.1044	38	-1240	<0.06
		B	-.0052	25	776	
	4	A	.1314	44	-1449	<0.01
		B	-.0911	19	567	
	8	A	.1294	39	-1399	<0.01
		B	-.2098	24	674	
	12	A	.1211	37	-1342	<0.02
		B	-.2446	26	674	
TWNTY-SX WK	2	A	.0488	32	-1030	NOT SIG.
		B	.0364	31	986	
	4	A	.0460	33	-1257	<0.03
		B	-.0513	30	759	
	8	A	.1047	40	-1439	<0.01
		B	-.1864	23	577	
	12	A	.1425	40	-1442	<0.01
		B	-.2688	23	574	

NOTES:

\*The Average Cumulative Residual is the simple arithmetic mean

of the 63 (62 in respect of the 26-week R.S.) total portfolio return residuals for each of the 63 (62) quarters for which the R.S. Tests are carried out for the given holding period.

+The expected Rank Sum is  $\pm 1008$  (977 for 62 tests) and the Expected Standard Deviation is 146 (143 for 62 quarters).

~The Significance Probabilities are computed using the normal approximation for the Wilcoxon Signed Rank Test.



## CHAPTER EIGHT

### ANALYSIS OF DATA - PART II EFFICIENCY TESTS IN RESPECT OF SEMI-STRONG INFORMATION

#### 8.1 - Introduction

##### 8.1.1 - ORGANISATION OF CHAPTER EIGHT

In addition to Section 8.1, this chapter is divided into the following sections:-

- 8.2 - The Method and Results of the Dividend Yield Test
- 8.3 - The Method and Results of the Dividend Growth Test
- 8.4 - The Method and Results of the Bonus Issues (stock splits) Test
- 8.5 - The Method and Results of the Earnings Forecast Error Test

##### 8.1.2 - INTRODUCTION TO SECTIONS 8.2 AND 8.3

###### - SUMMARY OF LITERATURE REVIEW ON DIVIDEND INFORMATION

As is noticeable from the above contents listing, two types of dividend information will be tested in this study. There are several reasons for putting this emphasis on dividend information and they are discussed below.

(a) Dividend and earnings information are the two most intensely researched information types. Insofar as dividends are unambiguous pieces of data and their meaning well understood, they form a most important type of information to be tested for market efficiency.

(b) As has been explained in Chapter Six, it has been feasible to gather the complete dividend record for all sample firms for the whole of the research period (the record in respect of earnings information is far less complete).

(c) From this writer's understanding of the market, it is apparent

that the Malaysian investors, companies and financial writers pay much greater attention to dividends than earnings. 255

While there is little doubt of the importance of dividends as information processed by the Malaysian market, there is little knowledge of how efficiently this information is used, unlike the Western markets. As discussed in Chapter Four, the picture concerning the degree of efficiency with which the Western markets handle past dividend information is at present a little unclear. While there are many researchers who believe that dividends have very little informational value, many others hold the opposite view. This dissertation takes the view that this difference in opinion could be partially explained by the type of dividend announcements on which the conclusion regarding the informational value of dividends is based and that some of the differences may be more one of degree rather than substance. Certain types of dividend announcements could have far greater informational value and hence market effect than others. Dividend announcements which contain information already known and discounted by the market or information which the market believes to have little useful content would be treated casually by the market.

There are several reasons why many of the dividend announcements in the US or the British market have little market effect. Firstly, the sheer sophistication of the market means that much of the information contained in a "normal" dividend announcement may already be known. Such could well be the case why Watts (1973) failed to find any correlation between dividend announcements and future returns as he used the annual dividend figures. The three interim announcements could have "given the clue away", as suggested by Laub (1976). Secondly the market probably understands that past dividends do not have much predictive value for future dividends or earnings (as shown by the work of Little and Rayner (1966) and Fama and Babiak (1968)). Thirdly, the market probably also understands that dividends are largely artificial quantities which are determined more at the whim of corporate managers who are usually most unwilling to reduce dividends (at least over the short run).

The foregoing comments does not mean that all dividend announcements has no informational value. It seems to this writer that unusual or unexpected dividend announcements can have a powerful effect on the price of stocks. The case of DEC in 1983 or ITT in 1984 could be cited in partial support of this. Both these stocks lost over one

third of their market value within a week of their announcing highly unexpected dividend reductions. The recent work of Asquit and Mullins (1983) on the strong impact of initiating or resuming dividends after a long break seems to lend support to this conclusion. It would seem that the work of Aharony and Swary (1980) on effects of non-concurrent dividend and earnings announcements supports the same contention. It seems reasonable to conclude that even in a market where the informational value of dividends is generally low, the market still pays some attention to all dividend announcements and that unexpected or unusual dividend announcements will lead to some market reactions. Thus the US market can be said to deal very efficiently with dividend announcements as a whole. In the schema of market efficiency proposed in Chapter One, the US market can be said to almost conform to the Stage III Efficiency. That is, the market generates a lot of information on dividend payments, the information so generated is correctly interpreted and in the majority of instances, the market acts speedily in accordance with its interpretation of the information on dividends.

Given the efficiency with which the US market deals with most dividend information, the various types of dividend information are therefore a good one with which to compare the efficiency of the Malaysian market. Two types of dividend information are selected for testing -- a relatively simple type and a more complex type. With our understanding of the market, we can have some prior expectation that the Malaysian market is likely to deal more efficiently with the simple information than the complex information. Section 8.2 will examine the efficiency with which the Malaysian market deals with dividend yield information. While superficially, dividend yield information may seem simple to understand and to use for investment decision making, in reality, it is an extremely complex piece of information to make proper use of. Section 8.3 will test the efficiency with which the market makes use of past dividend information. This is a straightforward type of information to understand. There has not been a test (as far as this writer knows) on exactly the same type of information in the West. An explanation will be provided later as to why this particular type of information is chosen.

## 8.2 - Test to Uncover Relationship of Dividend Yield and Return

### 8.2.1 - BACKGROUND TO THE TEST

The gulf between the thinking of lay investors and corporate officers on the usefulness and importance of dividend on one hand and that of most academics on the other is probably wider than in any other area of investment. Until today, most lay investors and corporate officers pay a lot of attention to the amount of dividend a company pays (as indicated by the work of Blume and Friend (1978)) and yet a large number of academics appear to agree with Miller and Modigliani's position that "dividend is irrelevant". The total amount of return an investor gets is a combination of dividend and capital gain. If the investor is rational, it should not make any difference to him in which form he gets his return after due adjustments have been made for taxation and transaction costs. Thus, contrary to the thinking of many fundamentalist writers, buying high dividend yield stocks should not provide an investor with higher return than buying low or zero yield stocks.

Tests for the effect on dividend yield on total return on investment are therefore among some of the commoner tests of efficiency carried out. However, it is not easy to test the dividend yield effect as there are many other factors which can affect the return on a stock other than dividend yield. It is possible that a direct cross sectional test of dividend yield against returns may produce a result which is biased and the significance of which would be difficult to estimate. An example of this type of problem can be seen from the work of Robinson (1951) as quoted by Brealey (1971). At first glance, Robinson's work appeared to reveal a strong relationship between dividend payout ratio and price earnings ratio. This work seemed to imply a prima facie case for the belief that the market seems to value high payout stocks. Deeper analysis revealed that this relationship had been erroneously drawn because several conditions (temporary low earnings, high leverage or higher expected future earnings) could all lead to a stock manifesting both high payout and and high PER although in no sense can it be regarded as "highly valued".

This realisation led Black and Scholes (1974) to pioneer the use of a

different technique to study the relationship between dividend yield and return. They applied an adaptation of the two parameter CAPM equation given below:-

$$E(\hat{R}_i) = \gamma_0 + \beta[E(\hat{R}_m) - \gamma_0] + \gamma_0(\delta_i - \delta_m)/\delta_m$$

Where  $\hat{R}_i$  = Expected return on stock i  
 $\hat{R}_m$  = Expected return on the market  
 $\delta_i$  = Dividend yield on stock i  
 $\delta_m$  = Dividend yield on market

To avoid bias in the regressions, Black and Scholes grouped the securities into 25 separate portfolios divided first by beta and then by yield. The multiple regressions were carried out based on the monthly data of dividend yield, price and return for every stock listed on the NYSE for the period 1947-1966. According to Black and Scholes, there was no significant dividend yield effect.

Blume (1980), later modified the methodology of Black and Scholes in several ways and replicated the tests on a bigger body of data and over a longer period of time (1936-1976). Blume similarly used the grouping technique developed by Black and Scholes. The first modification was the use of the following regression equation:-

$$r_{it} = a_t + b_t \beta_{it} + c_t \delta_{it} + \epsilon_{it}$$

Where  $r_{it}$  = Total realised return on stock i  
 $\gamma_{it}$  = Anticipated dividend yield on stock i  
 $\beta_{it}$  = Beta of stock i

The second involved conducting the test on quarterly rather than monthly data, his reasoning being that since corporations paid dividend once a quarter, a quarterly regression would lessen the ex-dividend effect of taxes. The third involved the use of "anticipated dividend yield" (the ratio of dividends paid over a 12-month period to the beginning-of-period price adjusted for general market movements) instead of the measure for dividend yield adopted by Black and Scholes (which is the ratio of the dividends paid over the previous 12 months to the price at the end of these 12 months). The third of these modifications appears to be the crucial one. It would seem that using end of the period price to compute

dividend yield (a la Black and Scholes) would weaken the power of this test since this measure of future dividend yield is only accurate if dividend payment is very sticky. Blume's concept of "Anticipated Dividend Yield" may be clearer if the computation steps are illustrated graphically as below:-

$$\text{ANTDY} = \frac{D_1 + D_2}{P_{(t-1)}} \times \frac{MI_t}{MI_{(t-1)}}$$

Where ANT DY = Anticipated Dividend Yield

P = Stock Price

D = Dividend payments

MI = Market Index

From the regressions carried out, Blume came to the conclusion that for certain decades of the research period, there was a significant dividend yield effect. Blume did not conclude that the market was irrational from this finding. Instead, he suggested that the most plausible explanation is that the market failed to anticipate the greater relative return for high yielding stocks. In the model of market information system developed in Chapter One, this would be Stage I efficiency. That is, the market has the information but it does not correctly interpret the meaning of its content.

### 8.2.2 - METHOD AND SAMPLE

Given the very much smaller number of securities in the present database, there is no possibility of replicating the methodology of Black and Scholes or Blume. However, as the required data are all ready in the database and since the dividend yield test is a fundamental test for market efficiency, it would be interesting to uncover the Malaysian market's reaction to this information.

It is therefore decided to carry out this test using direct cross sectional regression without grouping. This test is carried out with the realisation that it will not be a powerful test. In a sense, this test is a "negative" test to be considered in conjunction with the results of all the other tests to be carried out. If the test reveals



an association which is contrary to a majority of all the tests then we have to be very careful in interpreting the result. On the other hand, if the test reveals result which is inline with the other tests, we can perhaps more confidently accept the result as an accurate one.

As Blume's methodology is a development of Black and Scholes' and there had been no adverse criticisms of his work, it would seem to be more logical to adopt his method to the extent possible. There are two minor modifications to Blume's method. Firstly, in his tests, he adjusted the "anticipated dividend yield" by using the ratio of the year beginning market price index to the year end market price index. As there is no reliable market index available in Malaysia and such information is not readily obtainable from the database, it was decided to use the market return to adjust the "anticipated dividend yield". Secondly, in his test, the regressions were carried out once a quarter to minimise the tax effect of the quarterly dividend payment. As the vast majority of Malaysian companies pay dividends twice rather than four times a year, the current test is carried out with semi-annual regressions. It was also decided to extend the test to include also the regressions of the total return at the end of one year in addition to six months. The reason for doing so is that it is thought that if dividend yield has any effect, its effect may not show up over such a short run under the Malaysian conditions.

The tests are straightforward. The data on the beta, dividend yield and total return for each stock as well as return on the market are all in the database. The sample is made up of all the stocks in the database. The regressions are performed twice (i.e for the six month return and the annual return) once every six months. This results in 30 regressions for the six monthly return and 29 regressions for the yearly return. The multiple regressions are carried out using SPSS.

The summary results of the regressions carried out are shown below as Tables 8.2.1 and 8.2.2 respectively for the six monthly return and the annual return.

TABLE 8.2.1

RESULTS OF CROSS SECTIONAL REGRESSIONS OF 26-WEEK RETURN ON  
ANTICIPATED DIVIDEND YIELD AND BETA

$$r_{it} = a_t + b_t \delta_{it} + c_t \beta_{it} + \epsilon$$

PERIOD*	b	F VALUE	c	F VALUE	NO OF CASES
843	0.0125	0.774	-0.0131	0.054	56
869	0.0063	0.436	-0.0283	0.544	58
895	0.0024	0.072	-0.0907	5.207 x	60
921	0.0110	2.562 x	-0.0916	6.305 x	62
947	-0.0041	0.065	0.0741	0.766	65
973	0.0143	0.837	0.1550	3.239 x	66
999	-0.0513	1.790	0.0149	0.007	67
1025	-0.0510	0.581	1.2645	97.207 x	69
1051	0.0183	0.745	-0.1018	2.040 x	74
1077	0.0132	1.940	-0.3447	22.542 y	74
1103	0.0112	0.999	0.0036	0.002	74
1129	-0.0009	0.217	-0.3264	25.735 x	75
1155	0.0042	0.356	0.6077	16.618 x	75
1181	0.0020	0.649	-0.0050	0.015	76
1207	-0.0142	2.261 x	0.0516	0.813	76
1233	0.0016	0.043	-0.0680	2.158 x	75
1259	-0.0019	0.020	-0.0600	0.512	76
1285	0.0160	1.996	-0.1298	7.376 x	75
1311	0.0138	0.973	0.0915	3.467 x	76
1337	0.0051	0.128	-0.1378	5.946 y	76
1363	0.0211	2.282 x	-0.0051	0.007	76
1389	-0.0045	0.045	-0.0773	0.586	76
1415	-0.0991	3.020 x	-0.0844	0.274	76
1441	-0.0277	0.618	0.3261	8.709 y	76
1467	-0.0992	5.852 x	0.2914	6.547 x	76
1493	-0.0113	1.126	-0.2207	20.956 y	75
1519	-0.0198	0.757	-0.2100	3.808 x	74
1545	-0.0035	0.061	-0.1284	3.541 y	74
1571	0.0158	0.383	-0.0238	0.105	74
1597	0.0112	0.780	-0.0339	0.534	71
AVERAGE	-0.0070	1.079	0.0233	8.187	

TABLE 8.2.2

RESULTS OF CROSS SECTIONAL REGRESSION OF 52 WEEK RETURN ON  
ANTICIPATED DIVIDEND YIELD AND BETA FOR PERIOD

$$r_{it} = a_t + b_t \delta_{it} + c_t \beta_{it} + \varepsilon$$

PERIOD*	b	F VALUE	c	F VALUE	NO OF CASES
843	0.0134	0.234	-.0546	0.559	56
869	0.0231	2.171	-0.0903	2.444	58
895	0.0085	0.520	-0.1535	12.280	60
921	0.0023	0.029	-0.0683	1.154	62
947	0.0054	0.113	0.0054	0.003	65
973	-0.0327	0.517	0.1236	0.268	66
999	-0.2954	7.998	0.0679	0.020	67
1025	-0.0863	1.422	1.0815	31.696	69
1051	0.2042	12.572	-0.1514	5.313	74
1077	0.0458	2.585	-0.3541	22.420	74
1103	-0.0069	1.032	-0.2866	13.415	74
1129	0.0009	0.093	-0.0531	0.373	75
1155	0.0017	0.439	0.5176	9.951	75
1181	-0.0048	1.673	0.0702	1.203	76
1207	-0.0136	0.594	0.0523	0.420	76
1233	-0.0007	0.001	-0.1376	1.195	75
1259	0.0243	1.473	-0.2259	3.569	76
1285	0.0316	2.685	-0.0420	0.252	75
1311	0.0207	1.832	0.0460	0.537	76
1337	0.0251	0.716	-0.1657	2.616	76
1363	0.0019	0.005	-0.0835	0.513	76
1389	-0.0572	0.215	-0.1999	0.131	76
1415	-0.3213	6.191	0.1709	0.147	76
1441	-0.2380	9.132	0.9460	18.371	76
1467	-0.0664	1.111	0.3669	5.707	76
1493	0.0397	0.344	-0.2916	4.399	75
1519	-0.0085	0.053	-0.3947	7.880	74
1545	-0.0008	0.002	-0.2604	5.061	74
1571	0.0166	1.088	0.0056	0.007	74
AVERAGE	-0.0230	1.96	0.0152	5.238	

\*: Every week of the research period is given a number starting with 792 as the first week of 1968.

### 8.2.3 - RESULTS AND DISCUSSION ON THE DIVIDEND YIELD TESTS

#### (A) The 26 Week Realised Return

As can be seen from Table 8.2.1, anticipated dividend yield has very poor predictive power for total returns obtainable on a stock. The overall regression coefficient for dividend yield is very small; the average being only  $-0.007$ . Of the coefficients, 13 are negative. The negative average value is caused by the fact that the negative values are generally larger than the positive values. It is interesting to note that the negative coefficients coincide with periods of high market activities and rapidly increasing prices. During such periods, the shares of both high growth and speculative companies (both of which share the common characteristics of low dividend yield) has a tendency to be bid up by a greater extent than the "average" stock.

Of the 30 cross sectional regressions carried out, in only one case does the F value of the regression coefficient for dividend yield exceed 4.00 (for a significance probability of about 0.025). The average of the F values is only 1.08.

#### (B) The 52 Week Realised Return

The anticipated dividend yield has slightly better predictive power for returns over a period of one year. The average coefficient being  $-0.028$  and in four cases, the F value exceeds 4.00. The average F value is 1.96. Such level of significance can still be termed very low.

#### (C) Discussion of the Result

We have seen that over both 6 months and one year, the predictive power of anticipated dividend yield for adjusted realised returns is very poor. There are several possible alternative explanations for this result. Firstly, the market is very rational and fully comprehends the ramifications surrounding dividend yield as outlined at the beginning of this section. Secondly, the market may be less efficient than what was demonstrated by Blume such that its investors do not possess or make full use of the information on dividend yield. Thirdly, the regression result is in some way biased and does not provide a true picture of the situation. At this point, it

is very difficult to ascertain which of the explanations is the correct one.

Taken on its own, the result of the dividend yield test is probably not very material. It is perhaps better to consider this result in the light of the results from the other tests. As will be shown in the sections on the Dividend Growth (DG) and the Earnings Forecast Error (EFE) tests, the Malaysian market apparently does make use of past dividend and earnings information although it does not seem to use it correctly or quickly. It seems to this researcher that it is more difficult to make use of dividend yield information than the past dividend and earnings information. In the DG and EFE tests, certain assumptions are made about the market's use of past information on which to base stock investment decisions. In both cases, the information processing is quite straightforward. In the DG's cases, the market is assumed to base its investment decisions on the rate and stability of the past dividend payment stream. In the EFE's case, the market is assumed to base its investment decisions on the amount by which the current EPS deviates from its past pattern.

But in order to make investment decisions based on dividend yield information, the market is required to perform an additional step of information processing. That is, the riskiness as well as the future growth rate of each of the stock has to be taken into account in conjunction with the past dividend payment and current price. Only then will it be able to decide whether, at the current dividend yield, the stock makes a good investment. It would seem that this is rather more difficult than the other two types of information processing. If Blume's conclusion is correct in that the US investors are not fully efficient on the use of dividend yield information, it is possible that the Malaysian investors may be even less efficient.

In view of the results from the other three tests on accounting information, it seems to this researcher that it would be more logical to conclude that the possibility exists that Malaysian market does not make much use of dividend yield information in making its investment decision. This is because information on the future growth rate of stocks is not generally available and investors are therefore not able to relate this information to the correct pricing of stocks in term of their dividend yield. It is interesting to note that over a period of one year, dividend yield appears to have slightly more predictive power for return. Tenuous as this evidence

is, it would seem to suggest that there may be a small number of long term investors who could be in possession of more in-depth dividend yield information.

#### 8.2.4 - CONCLUSION

Taken by itself, the dividend yield test as described is not a particularly useful test. The importance of this test is to round out the range of informational efficiency being tested in this dissertation. It is also important in that it provides a comparison with the situation in the US. It is therefore better not to make a statement regarding the efficiency of the Malaysian market with respect to dividend yield information at this stage. Another study of the result will be made in Chapter Nine.



### 8.3 - Test to Uncover the Degree of Efficiency in the Use of Past Dividend Information

#### 8.3.1 - BACKGROUND TO THE TEST

This test is rooted in the belief (the basis for this belief has been discussed in Section 8.1.2) that given the complexity of the process of stock evaluation, it is unlikely that in a well developed market, a simple rule of thumb based on historical accounting information is of any use in pricing stocks. That is, it is very unlikely that a simple rule of thumb like "buy only blue chips" or "buy stocks with high dividend growth" will yield abnormal profit. In an efficient market, competitive bidding will ensure that the prices of stocks chosen using such rules would rise to a level whereby its future return would be in line with that of the market.

However, in a less than perfectly efficient market, there may exist some investors who would attempt to follow such rules. By following such rules, they would bid the price of the chosen stocks to a level where their future return would be less than what one would expect (Stage II efficiency). In an even less efficient market, such rules may be made to yield abnormal profit (Stage I efficiency). We know that the US market is of the first type as far as most types of accounting information are concerned. The purpose of this test is to explore how inefficient the Malaysian market is.

The accounting information to be tested here is dividend information, more specifically, the information contained in the dividend series of each firm in terms of its consistency and growth rate. The reasons for choosing dividend as against earnings information have been provided in Section 8.1.2. It is to be noted that no Western researcher has performed a test on exactly the same type of information. Although this test can be regarded as "new" in this sense, it is actually well founded on previous tests which have been performed in the West. Its concept and methodology are almost entirely based on the test conducted by Jones, Tweedy and Whittington (1976). In addition, Watts (1973) has carried out a very similar test on the information content of dividend changes.

The idea behind Jones, Tweedie and Whittington (JTW) is that a less than perfectly efficient market may pay "too much" attention to the past good performance of the listed companies. That is, companies which have undergone a period of good performance may be bid up excessively such that the purchasing of these stocks would provide lower than expected return. The corollary of that would be that the purchasing of stocks of "bad performing" companies would yield abnormal high return.

JTW defined "good performing companies" as those which have: (a) above-average past profitability (defined as a high Return on Equity); and (b) high Price/Earnings ratio. The result of the test showed that it was not possible to achieve abnormal returns by buying stocks with poor past performance.

Assuming that the British market is as efficient as the American one, it is not surprising that JTW were not able to uncover evidence in support of their conjecture that the market could possibly pay too much attention to past performance.

Given the preference for using dividend information for this study, it was therefore decided to modify JTW's test slightly in terms of its definition of "good performing companies". Instead of basing the definition of good performance on high ROE and high PER, this test is based on high past dividend growth rate and high consistency for such growth rate. There is also one practical reason for choosing these particular criteria. In an economy that is largely based on commodities, listed firms do not demonstrate stable earnings. In contrast, there are a number of large listed companies which demonstrate high and regular dividend growth rate.

### 8.3.2 - METHOD AND SAMPLE

The test is based on the conjecture that the Malaysian market either fails to make use of past dividend information or uses it incorrectly in the process of pricing stocks. Assuming that good performance is consistent (unlike the Western companies), if it does not make use of past dividend information, it would be possible to obtain abnormal gain by purchasing companies with past good performance. This would be a case of gross inefficiency. It is likely that the market would be more efficient than this. It is possible that the Malaysian

market, being less developed than the British one, would behave in the manner postulated by JTW. That being so, the purchase of companies with good past performance will provide subnormal returns while the purchase of poor performing companies will provide supranormal returns.

The first step in running the test is to carry out five-year moving linear regressions on the dividend record for every one of the stocks in the database. The regressions are performed annually starting with 1971 (using data from 1967-1971). Each of the regressions is based on five years' dividend record computed with "six monthly rest". That is, the total dividend paid in the previous 12 months is computed once every six months (dividend is usually paid twice a year in Malaysia). Thus there are ten data points for each regression. While it would be more logical to perform semi-logarithmic regressions on the data, linear regressions are used owing to the problem of breaks in the stream of dividends. It is felt that over five years, the bias introduced by using linear regression on a series with probably multiplicative rate of increase would not be too excessive.

After the yearly regressions have been performed, the stocks are then ranked according to their annual dividend growth rates. From this annual ranking of dividend growth rate and the information on consistency of dividend growth in terms of its coefficient of determination, it is possible to choose two categories (portfolios) of stocks respectively known as Class A and Class B stocks. The Class A stocks are defined as the 14 stocks which are top ranked in dividend growth rates with a regression coefficient for dividend growth of greater than 0.88 (giving a coefficient of determination of 0.77). Class B stocks are defined as the 14 stocks which are bottom ranked in terms of dividend growth rates without taking into account the coefficient of regression of the computed growth rate. The number of stocks within each category and the hurdle regression coefficient are chosen in order to provide an adequate degree of separation between the two categories of stocks in all the years.

The logarithm of the return residual for each stock within each portfolio is recorded both on an annual as well as cumulative basis for each of the years subsequent to portfolio formation till the end of the research period. The total and mean return relative of each portfolio for all the years are also computed. A sample of the work sheet (that of the 1980 portfolio) from this step is reproduced as

Exhibit 8.3.1 appended to the end of this section.

The mean return relative for each portfolio is then compared with the mean return relative of all the stocks within the database for the respective year both on an annual as well as cumulative basis. The comparisons are given at the end of this section as Table 8.3.4 (annual) and Table 8.3.5 (cumulative).

It is to be noted that the mean risk adjusted cumulative return relative of all the stocks in the database gradually increases with the years such that at the end of twelve years, it is considerably different from 1.0. There are two probable causes for this non-stationarity. Firstly, the regressions carried out for the computation of beta are based on weekly returns and as a result the long term growth trend is probably masked to a certain extent. Secondly, the portfolios are equal weighted which gives greater relative weight to the smaller companies which probably grew faster during this period.

### 8.3.3 - DISCUSSIONS AND CONCLUSION

#### (A) ANNUAL RETURNS FROM PORTFOLIOS - FROM YEAR OF SELECTION TO 1983

Individual Portfolios As can be seen from the last column of Table 8.3.4, the mean return relatives of the individual Class A and Class B portfolios for each of the years following their formation to the end of the research period do not appear to be significantly different from the mean return relative of the stocks in the database for the given year. For the Class A Portfolios, the fraction of the years in which the chosen stocks produce a superior mean return compared with the database stocks varies from 3/11 (0.18) to 2/3 (0.67) with a mean 0.48. For the Class B Portfolios, the fraction varies from 7/10 (0.70) to 1/3 (0.33) with a mean of 0.52.

It would appear that over the longer term, the portfolio selection method cannot produce a portfolio which can provide a return which is significantly different from the average on a year-to-year basis. The cross sectional comparisons however produce very different conclusion as we can see in the next paragraph.

SUMMARY OF CROSS SECTIONAL PERFORMANCE  
OF CLASS A AND CLASS B STOCKS  
- ANNUAL COMPARISON WITH ALL OTHER STOCKS IN DATABASE

YEAR AFTER PORT. FORM'N	NO OF CASES	NO CASES IN WHICH PORT. A IS BETTER	SIGNIF. PROB.	NO CASES IN WHICH PORT. B IS BETTER	SIGNIF. PROB.*
+ 1	12	4	0.1331	11	0.0012
+ 2	11	4	NS	4	NS
+ 3	10	6	NS	6	NS
+ 4	9	5	NS	4	NS
+ 5	8	5	NS	5	NS
+ 6	7	2	NS	2	NS
+ 7	6	3	NS	2	NS
+ 8	5	3	NS	4	NS
+ 9	4	3	NS	1	NS
+10	3	3	0.0	1	NS
+11	2	0	0.0	0	0.0
+12	1	0	0.0	1	0.0

\*: Significance Probability obtained by Wilcoxon Signed Rank tests.

NS : Significance Probability Is Greater Than 0.15

Cross Section of Portfolios Table 8.3.1 above provides a summary of the cross sectional performance of the Class A and Class B portfolios compared with the database stocks. The detailed information can be seen in Table 8.3.4 which is appended to the end of this section. The cross sectional comparison uncovers an interesting difference in the relative performance of the Class A Portfolio and the Class B Portfolio.

In the first year after portfolios formation, the Class B portfolios appear to perform very much better than the database stocks. Of the 12 portfolios available for comparison, 11 outperform the database stocks in terms of mean risk adjusted return relative. When Wilcoxon Signed Rank test is applied to the ranking of the differences in the mean performance of the Class B stocks versus the database stocks, the null hypothesis that the two should not produce distinguishable

return is rejected at the significance level of 0.0012. There is therefore little doubt that stocks chosen for the Class B portfolio perform significantly better than the database stocks on an overall basis in the first year after selection into the Class B portfolio.

As can be seen from the same table, in the first year after portfolio formation, the Class A portfolios appear to perform slightly worse than the database stocks. Of the 12 portfolios compared, only 4 outperform the mean database performance. When similar Wilcoxon Signed Rank test as above is applied to the differences in the return relatives, the test indicates that the inferior performance of the Class A stocks is not quite significant (significance probability of 0.1331).

In the second and subsequent years after portfolios formation, neither the Class A nor the Class B portfolios perform significantly better or worse than the database stocks until the tenth year and after (Table 8.3.1). By this time, there are only three or less instances for comparison and the results cannot be usefully considered.

#### Performance of Individual Portfolios One Year After Formation

Given the interesting overall cross sectional performance of the Class A and Class B portfolios in the first year after portfolios formation, it is decided to examine more closely the performance of the individual portfolios one year after formation.

On an individual basis, the performance of the Class B stocks after one year is less conclusive. When Wilcoxon Rank Sum tests are applied to the yearly ranking of the individual Class B stock return relatives versus all the other return relatives in the database, 8 out of the 12 portfolios produce a result which can be said to be significantly different from that of the database. The detail of the results of the Wilcoxon Rank Sum tests are provided in Table 8.3.2 below.

When the same tests are applied to the yearly ranking of return relatives of the Class A stocks versus the rest of the database, in only five instances can the performance of the Class A stocks be thought of as being significantly inferior to that of the database stocks.



TABLE 8.3.2

RESULTS OF WILCOXON RANK SUM TESTS APPLIED TO COMPARISONS OF RETURN RELATIVES BETWEEN PORTFOLIO STOCKS AND ALL OTHER STOCKS IN THE DATABASE FOR THE GIVEN YEAR ONE YEAR AFTER PORTFOLIO FORMATION

PORT. YEAR	CLASS A PORTFOLIO	CLASS B PORTFOLIO
1971	NS	0.0129
1972	0.0548	NS
1973	0.0885	0.0808
1974	0.1423	NS
1975	0.0099	0.0475
1976	NS	NS
1977	NS	0.0559
1978	NS	0.0571
1979	NS	0.0853
1980	0.1131	0.0853
1981	NS	NS
1982	NS	0.0594

NS : Significance Probability Is Greater than 0.15

#### (B) CUMULATIVE RETURNS FROM PORTFOLIOS

Class B Portfolios On a cumulative basis, the superior return achieved by the Class B portfolios in the first year appears to dissipate rapidly in the next two or three years. As can be seen from Table 8.3.3 below, the fraction of the Class B portfolios which has superior mean return relative declines from 11/12, to 8/11, 7/10 and 6/9 from the first to the fourth year after portfolios formation. From the sixth year onward, there are indications that the Class B portfolios perform less well than the database stocks but the sample is too small to make a stronger assertion. When Wilcoxon Signed Rank tests are performed on the the ranking of the cross sectional return relatives, it is only during the first three years that the Class B portfolio cumulative returns show significantly better performance than the database. The null hypothesis that there should be no difference between the performances of the two can be rejected at levels of significance of respectively 0.0012, 0.0337 and 0.0967 for the first three years. Taking into consideration the findings on the

annual portfolio return relatives discussed above, it is probably correct to say that the abnormal return obtainable from the Class B portfolios is available for a short duration only; much of the benefit is lost by the second year.

**Class A Portfolios** The cumulative return obtainable on the Class A portfolios is very different from that of the Class B portfolios. The marginally inferior return of the first year after portfolios formation appears to get steadily worse over the years. As can be seen from Table 8.3.3, the fraction of the Class A portfolios having a superior mean return compared to the database stocks has fallen to 1/10 and 1/9 by third and fourth years respectively. Although the return appears to improve a little in the fifth and subsequent years, the improvement is small. In all years from the third onward, the cumulative return relative obtainable from Class A portfolio is significantly inferior to that of the database as a whole. Evidence therefore indicates that the inferior return obtained from Class A stocks can be very persistent; its effect seems to linger for many years.

SUMMARY OF CUMULATIVE CROSS SECTIONAL  
PORTFOLIO PERFORMANCE OF CLASS A AND CLASS B STOCKS

YEARS AFTER PORT. FORM'N	NO OF CASES	NO CASES IN WHICH PORT. A IS BETTER	SIGNIF. PROB.*	NO CASES IN WHICH PORT. B IS BETTER	SIGNIF. PROB.*
+ 1	12	4	0.1331	11	0.0012
+ 2	11	5	0.1030	8	0.0337
+ 3	10	1	0.0737	7	0.0967
+ 4	9	1	0.0098	6	NS
+ 5	8	2	0.0273	4	NS
+ 6	7	2	0.0391	1	NS
+ 7	6	1	0.0781	2	NS
+ 8	5	1	0.0675	1	NS
+ 9	4	0	0.0	0	0.0
+10	3	0	0.0	0	0.0
+11	2	0	0.0	0	0.0
+12	1	0	0.0	0	0.0

\*Significance Probability computed using Wilcoxon Signed Rank Test

#### 8.3.4 - CONCLUSION

Based on the foregoing discussion of the result from the JTW type tests on a stock selection method based on historical dividend data, it is possible to make the following conclusions regarding the Malaysian stockmarket:-

(1) It appears that the Malaysian stockmarket is not inefficient to the extreme with regard to historical dividend data in that it does not appear possible to make abnormal gains by simply buying "good" stocks or selling "bad" stocks;

(2) It appears that the market does make use of past dividend information for stock selection. Evidence uncovered seems to indicate that the market places a premium on stocks with rapid and consistent dividend growth and a discount on stocks with slow dividend growth.

Such marking ups and discountings appear to be carried out to an extent which is not fully justifiable. The return in the years subsequent to their selection based on past dividend criteria is inconsistent with their past performance. There is strong evidence to suggest that stocks with a history of poor dividend performance may be excessively undervalued by the market such that in the immediate years after their selection, their mean performance is superior to that of the other stocks in the database. There is also some evidence, though less strong, to suggest that stocks with good dividend performance may be overvalued by the market such that the return obtainable from the latter stocks is inferior to the market as a whole in the years subsequent to their selection.

(3) It appears that the period during which Class B stocks are selling at a discount is relatively short - about one year. From the second year onward, the stocks appear to be selling at the same level as other stocks such that their returns in subsequent years are indistinguishable from the average return. It is possible that the five year period used as the basis of selecting Class A and Class B stocks may be too long such that similar benefit can be obtained even if the selection is based on four years of dividend information. If this is the case then the undervaluation of Class B stocks may be longer than it appears here.

The poor returns obtainable from Class A stocks appear to persist for a very long period. The persistence of the low return from Class A stocks is mystifying. It could perhaps be due to the lack of persistence of good dividend performance of Malaysian/Singaporean companies. A period of strong dividend growth could be a "flash in the pan" event not to be repeated for some years. The market may not be aware of this and persist in overvaluing the "good" stocks for many more years after their period of good performance is over. At this juncture, it is not possible to offer any evidence to support this conjecture.

TABLE 8.3.4

## MEAN ANNUAL PORTFOLIOS' RISK ADJUSTED RETURN RELATIVES

## (A) LONGITUDINAL STUDIES OF INDIVIDUAL PORTFOLIOS

NUMBER OF YEARS AFTER PORTFOLIO FORMATION													
	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12	
PORT. YEAR & TYPE													NO OF CASES BETTER THAN DB
1971													
A	1.1484	1.0578	0.9955	1.1034	1.0727	1.1100	1.0540	0.9950	1.0282	1.0667	0.9356	0.9805	7/12
B	1.2741	0.9497	0.9464	1.0455	0.9541	1.0457	1.0242	1.1209	1.1648	0.9864	0.9265	1.0368	4/12
DB	1.1282	1.1212	0.9853	0.9923	1.0597	1.0786	1.0258	1.0785	1.1493	1.0276	0.9628	1.0368	-
1972													
A	1.0134	0.9638	1.0922	0.9970	1.0250	1.0160	0.9581	1.0149	1.1022	0.9965	0.9524		3/11
B	1.0907	0.9124	0.9985	0.9242	1.0913	1.0495	1.0509	1.4000	1.0383	0.8402	0.7761		5/11
DB	1.1212	0.9853	0.9923	1.0597	1.0786	1.0258	1.0785	1.1493	1.0276	0.9628	0.9808		-
1973													
A	0.8915	1.1023	0.9908	1.0565	1.1412	1.0346	0.9912	1.0591	0.9779	0.9892			5/10
B	1.0593	0.9914	1.0688	1.1766	1.0379	1.0172	1.3706	1.0958	0.8067	1.0186			7/10
DB	0.9853	0.9923	1.0597	1.0786	1.0258	1.0785	1.1493	1.0276	0.9628	0.9808			-
1974													
A	1.0821	1.0052	0.9989	1.0891	1.1169	1.1164	0.9500	0.9864	1.0588				5/9
B	1.0062	1.2292	1.2105	1.0190	1.0326	0.9648	1.0799	1.0240	0.9637				5/9
DB	0.9923	1.0597	1.0786	1.0258	1.0785	1.1493	1.0276	0.9628	0.9808				-
1975													
A	0.9299	1.0274	1.0708	1.004	1.0374	0.9989	0.9839	1.0964					3/8
B	1.1950	1.2343	0.9752	1.0040	1.3895	1.1911	0.8947	0.9093					4/8
DB	1.0597	1.0786	1.0258	1.0785	1.1493	1.0276	0.9628	0.9808					-
1976													
A	1.0525	1.0642	1.1094	1.0252	1.0356	0.9217	1.0782						4/7
B	1.1294	1.0205	1.1192	1.1701	1.1375	0.9135	0.8615						4/7
DB	1.0786	1.0258	1.0785	1.1493	1.0276	0.9628	0.9808						-
1977													
A	1.0437	1.0731	1.1178	1.0211	0.9216	1.0606							2/6
B	1.1053	1.1818	1.2238	1.0161	1.0092	0.8809							4/6
DB	1.0258	1.0785	1.1493	1.0276	0.9628	0.9808							-

TABLE 8.3.4 CONTD

1978

A	1.0733	1.0889	0.9936	0.9926	1.0239	2/5
B	1.1385	1.1391	1.0748	1.0441	0.8819	3/5
DB	1.0785	1.1493	1.0276	0.9628	0.9808	-

1979

A	1.0282	0.9759	0.9783	1.0406	2/4
B	1.3608	1.1046	0.9495	0.8907	2/4
DB	1.1493	1.0276	0.9628	0.9808	-

1980

A	0.9191	0.9730	1.1234	2/3
B	1.1547	0.9092	0.8856	1/3
DB	1.0276	0.9628	0.9808	-

1981

A	0.9525	1.1124	1/2
B	0.9757	0.9240	1/2
DB	0.9628	0.9808	-

1982

A	1.0070	1/1
B	1.0536	1/1
DB	0.9808	-

(B) CROSS SECTIONAL STUDIES OF PORTFOLIOS OF SAME AGE -  
MEAN RISK ADJUSTED RETURN RELATIVES OF PORTFOLIOS OF SAME AGE

	NUMBER OF YEARS AFTER PORTFOLIOS FORMATION											
	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12
A	1.0118	1.0403	1.0471	1.0473	1.0468	1.0369	1.0026	1.0304	1.0418	1.0175	0.9440	0.9805
B	1.1286	1.0542	1.0452	1.0323	1.0686	1.1118	1.0364	1.1100	0.9809	0.9484	0.9513	1.0368
DB	1.0492	1.0420	1.0295	1.0341	1.0914	1.0433	1.0375	1.0398	1.0301	0.9904	0.9718	0.9808

NO OF CASES IN WHICH CLASS A AND B PORTFOLIOS ARE SUPERIOR TO DATABASE STOCKS

A	4	4	6	5	5	2	3	3	3	3	0	0
B	11	4	6	4	5	2	2	4	1	1	0	1

NUMBER OF CASES IN EACH AGE GROUP

12	11	10	9	8	7	6	5	4	3	2	1
----	----	----	---	---	---	---	---	---	---	---	---



TABLE 8.3.5

ANNUAL PORTFOLIOS' ADJUSTED RETURN RELATIVES - CUMULATIVE

		NUMBER OF YEARS AFTER PORTFOLIO FORMATION										
PORTFOLIO		+2	+3	+4	+5	+6	+7	+8	+9	+10	+11	+12
YEAR	TYPE											
1971	A	1.2004	1.2171	1.3367	1.4723	1.7375	1.6089	1.6135	1.7173	1.7664	1.5485	1.4568
	B	1.1867	1.0819	1.0842	1.0185	1.0536	1.074	1.2054	1.4098	1.3474	1.1877	1.1540
	DB	1.2650	1.2464	1.2368	1.3107	1.4137	1.4503	1.5641	1.7976	1.8472	1.7784	1.7440
1972	A	0.9929	1.0612	1.0717	1.0787	1.0949	1.0242	1.0337	1.1328	1.1315	1.0818	
	B	1.0116	0.9703	0.8995	0.9468	0.9757	1.0351	1.3471	1.2628	1.0374	0.9689	
	DB	1.0476	1.0963	1.1617	1.2530	1.2854	1.3863	1.5932	1.6372	1.5763	1.5458	
1973	A	0.9908	0.9477	0.9995	1.1254	1.1452	1.1606	1.1446	1.0945	1.0755		
	B	1.0688	1.1874	1.3967	1.3248	1.3642	1.6988	1.8163	1.3687	1.2895		
	DB	0.9777	1.0361	1.1175	1.4641	1.2364	1.4270	1.4602	1.4058	1.3786		
1974	A	1.0727	1.0844	1.1584	1.2934	1.4761	1.3234	1.2701	1.3065			
	B	1.2163	1.4919	1.3878	1.4106	1.3897	1.4228	1.4228	1.2830			
	DB	1.0516	1.1342	1.1635	1.2549	1.4422	1.4820	1.4268	1.3992			
1975	A	0.9685	1.0032	1.1294	1.2251	1.1361	1.0599	1.1602				
	B	1.5120	1.3413	1.3329	1.8164	2.2206	1.6874	1.4080				
	DB	1.1430	1.1725	1.2646	1.4534	1.4935	1.4379	1.4101				
1976	A	1.1139	1.2443	1.2910	1.2522	1.01271	1.2094					
	B	1.1091	1.2130	1.5018	1.4762	1.2634	1.0443					
	DB	1.0645	1.1933	1.3715	1.4093	1.3368	1.3306					
1977	A	1.1201	1.2540	1.1855	1.0753	1.1446						
	B	1.2941	1.6399	1.4725	1.4223	1.2303						
	DB	1.1064	1.2716	1.3066	1.2850	1.2337						
1978	A	1.1723	1.0889	1.0885	1.1218							
	B	1.3018	1.3465	1.3688	1.1606							
	DB	1.2395	1.2737	1.2263	1.2026							
1979	A	0.9817	0.9549	0.9482								
	B	1.5264	1.2652	1.1071								
	DB	1.1810	1.1370	1.1150								
1980	A	0.9083	0.9649									
	B	1.0226	0.8719									
	DB	0.9893	0.9702									
1981	A	1.0455										
	B	0.8836										
	DB	0.9442										
MEAN	A	1.1472	1.0825	1.1342	1.2055	1.2659	1.2329	1.2444	1.3128	1.3245	1.3152	1.4568
RETURN	B	1.1939	1.2409	1.2835	1.3220	1.3568	1.3271	1.4399	1.3325	1.2248	1.0787	1.1540
REL.	DB	1.0918	1.1531	1.2182	1.3254	1.3517	1.4180	1.4909	1.5600	4.6007	1.6621	1.7440

## EXHIBIT 8.3.1

WORKSHEET FOR THE COMPUTATION OF INDIVIDUAL STOCK AND PORTFOLIO  
RETURN RELATIVES AND MEAN PORTFOLIO RETURN RELATIVES

	1981		1982				1983			
	RETURN	ANTI LOG	RETURN	ANTI LOG	CUM RET	ANTI LOG	RETURN	ANTI LOG	CUM RETUR	ANTILOG
CLASS B STOCKS										
BJT	-0.3288	0.7198	-0.1240	0.8834	-0.4528	0.6358	0.0584	1.0602	-0.3944	0.6741
PHC	0.2424	1.2743	-0.0066	0.9934	0.2359	1.2660	0.0507	1.0520	0.2865	1.3318
NBT	0.2325	1.2618	0.4736	1.6057	0.7061	2.0261	-0.4638	0.6289	0.2423	1.2742
PMC	-0.1911	0.8261	0.0264	0.0267	-0.1647	0.8481	0.1484	1.1600	-0.0163	0.9838
UOL	0.4344	1.5440	-0.1723	0.8417	0.2621	1.2996	-0.3139	0.7306	-0.0519	0.9495
AKM	-0.1058	0.8996	0.1400	1.1503	0.0342	1.0348	-0.0004	0.9996	0.0338	1.0344
MYS	0.4222	1.5253	-0.5563	0.5733	-0.1341	0.8745	0.1157	1.1227	-0.0184	0.9817
PRT	0.6195	1.8580	-0.6979	0.4976	-0.0784	0.9246	-0.0308	0.9696	-0.1092	0.8965
SLD	0.0765	1.0795	-0.3394	0.7122	-0.2629	0.7688	-0.2682	0.7648	-0.5311	0.5880
CEM	-0.2415	0.7854	0.2011	1.2228	-0.0404	0.9604	-0.1183	0.8884	-0.1587	0.8532
SPP	-0.2015	0.8175	-0.4420	0.6427	-0.6435	0.5255	-0.1018	0.9032	-0.7453	0.4746
CTD	-0.0215	0.9787	-0.2727	0.7613	-0.2942	0.7451	-0.3906	0.6766	-0.6849	0.5042
CPP	0.0893	1.0934	-0.2370	0.7890	-0.1477	0.8627	-0.1875	0.8290	-0.3352	0.7152
MER	0.4071	1.5025	0.0275	1.0279	0.4346	1.5444	-0.4908	0.6121	-0.0562	0.9454
AVG	0.1024		-0.1414		-0.0390		-0.1424		-0.1814	
TOTAL		16.1659		12.7281		14.3163		12.3977		12.2065
MEAN		1.1547		0.9092		1.0226		0.8855		0.8719
CLASS A STOCKS										
BTD	-0.4809	0.6182	-0.3855	0.6801	-0.8664	0.4205	0.3603	1.4337	-0.5062	0.6028
HLO	0.0322	1.0327	0.1530	1.1653	0.1852	1.2034	-0.0597	0.9421	0.1255	1.1337
CSB	0.0979	1.1028	-0.2562	0.7740	-0.1583	0.8536	-0.0179	0.9822	-0.1762	0.8385
CNC	-0.1815	0.8340	0.1002	1.1054	-0.0813	0.9219	0.3173	1.3734	0.2360	1.2662
TAN	-0.4727	0.6233	0.1318	1.1409	-0.3409	0.7111	0.1924	1.2122	-0.1485	0.8620
GHS	0.0697	1.0722	-0.1276	0.8802	-0.0579	0.9437	0.0998	1.1050	0.0419	1.0428
TAS	0.2105	1.2343	0.1327	1.1419	0.3432	1.4095	-0.3871	0.6791	-0.0439	0.9571
UAC	0.0858	1.0895	-0.1346	0.8740	-0.0489	0.9523	0.1868	1.2054	0.1380	1.1479
KLK	-0.2221	0.8008	0.1244	1.1324	-0.0978	0.9069	0.1836	1.2016	0.0859	1.0897
DHI	0.0896	1.0937	0.0429	1.0439	0.1325	1.1417	-0.2067	0.8133	-0.0742	0.9285
ESS	-0.0187	0.9815	0.1198	1.1273	0.1012	1.1065	0.2091	1.2325	0.3102	1.3638
HTC	0.1253	1.1335	0.0742	1.0770	0.1995	1.2208	-0.1732	0.8410	0.0263	1.0266
PTL	-0.5100	0.6005	-0.2778	0.7574	-0.7878	0.4549	0.4222	1.5254	-0.3655	0.6938
RHM	-0.4302	0.6504	-0.3247	0.7228	-0.7549	0.4701	0.1668	1.1815	-0.5881	0.5554
AVG	-0.1146		-0.0448		-0.1595		0.0924		-0.0671	
TOTAL		12.8677		13.6226		12.7168		15.7282		13.5087
MEAN		0.9191		0.9730		0.9083		1.1234		0.9649

## 8.4 - A Test to Uncover the Market's Reaction to Bonus Issues

### 8.4.1 - BACKGROUND TO THE TEST

This test is based on the wellknown work of Fama, Fisher, Jensen and Roll (1969) (FFJR) which does not require introduction here. FFJR found that the US market appeared to respond efficiently to the announcement of stock splits. That is, the market seems to understand that stock splits per se do not add value to the stocks concerned. Thus, after the announcement of a split, stocks do not on an average provide higher than normal return. More specifically, they found that stock splits seemed to be the result of a period of rising stock price rather than the other way round. Stock splits could therefore be regarded as confirmation of the market's expectation that a particular stock is going to do well. If this expectation is fulfilled (by the occurrence of a stock split with an increased dividend later), the stock's price would not show any further response. If this expectation is not fulfilled, as in the case of stocks which have had to reduce dividend subsequent to the split, the price of the stocks involved would decline. The market can therefore be said to be very efficient in terms of information on stock splits.

However, the situation in Malaysia gives the impression that the investors do not seem to understand fully the meaning of a bonus issue. A student of finance schooled in the Western tradition who moves to Malaysia, would be amazed by the amount of press coverage and general interest generated by rumours or news of an impending bonus. This is very much in contrast to the way American investors treat the news of an impending stock split. This leads this researcher to postulate that it is conceivable that the Malaysian market may not treat the news of bonus issues as efficiently as the US market treats news of a stock split. It is therefore proposed that the FFJR test is replicated as closely as possible in Malaysia.

#### 8.4.2 - METHOD AND SAMPLE

##### (A) METHOD

Malaysia, much like the rest of the British Commonwealth, uses the British accounting procedures (with a few exceptions). As a result, stock splits are not normally practised by the listed companies. Instead, like British firms, they issue bonus shares. Although bonus issues are procedurally different from stock splits, they are identical from the financial point of view. FFJR's method will therefore be replicated using bonus issue announcements rather than stock splits. FFJR's methodology will be replicated with four modifications.

Firstly weekly data is used instead of monthly data. It is expected that weekly data would provide a finer picture of the market's reaction. Secondly, the CAR is computed for 50 weeks before and after the bonus announcement rather than 30 months before and after the announcement. The reason for doing so is that it is obvious from looking at the results of FFJR's tests that much of the important "action" takes place in the 24 month period surrounding the split announcement. Third, the status of "increased" or "decreased" dividend payment of a stock is defined on an absolute basis rather than relative to the average of all the stocks listed on the Exchange. Defined on this basis, one would often obtain the situation of a static dividend payment which is not obtained in FFJR's methodology since it is extremely unlikely that the rate of change in the dividend payment of a stock is identical to that of the average of all stocks. As a result, stocks which maintain the same absolute dividend after the announcement are regarded as being in the same category as those having reduced dividend on the reasonable assumption that in Malaysia, the average change in the dividend payment of all listed companies is positive.

The last and probably the only major modification to FFJR's method is in the way by which the alphas and betas (required for the computation of the residuals) are computed. FFJR realised that the alphas and betas would not be stable around the time of the split announcements. In order to compute the "normal" alphas and betas, they use the data from the whole of the research period (1927-1959) in a single block for carrying out the regressions and they also exclude the data for the 15 months before and after the split. Owing

to the lack of stationarity of local alphas and betas ( as shown in Chapter 6) and the far shorter duration of the test, FFJR's method for computing the "normalised" alphas and betas has to be modified for the current test.

As explained in Chapter 6, the alphas and betas of the sample stocks have been computed using moving blocks of data of three calendar years in size. Rather than recomputing the alphas and betas using an approximation of FFJR's method, it was decided to make use of the pre-existing values of alphas and betas by taking the average of the alphas and betas computed from blocks of data which are some distance away from the bonus announcement. A preliminary investigation is carried out to examine the behavior of the alphas and betas surrounding bonus announcements and the result is shown as Table 8.4.1. This table shows the mean value of the alphas and betas of the stocks undergoing a bonus issue in a given year for the 6 calendar years surrounding the bonus announcement. As can be seen from the table, the alphas show a pronounced "blip" surrounding the bonus announcement. However, this "blip" is of short duration; alphas computed from three year block of data ending two calendar years before the announcements and three calendar years after the announcements are much smaller than the alphas computed from the three year block of data ending the calendar year of the announcement.

The computed betas do not show a clear pattern of abnormal behavior as with the alphas. As can be seen from Table 8.4.1, there only seems to be a tendency for the betas to rise throughout the 6 years surrounding the bonus announcements. It is not possible to provide a complete explanation for this pattern of behavior. This tendency can probably be explained in part by the fact that the average value of the computed betas have been rising over the research period (this pattern has been examined in Chapter 6). It is also possible that stocks which issue bonus could have attracted greater market attention subsequent to making the bonus issue, hence resulting in their having higher betas.

Given the abnormal behavior of the alphas, both parameters have to be normalised for the computation of the residuals. An examination of the effect of this normalisation will be undertaken later.

TABLE 8.4.2

AVERAGE VALUE OF ALPHA AND BETA OF STOCKS UNDERGOING BONUS ISSUE  
FOR YEARS SURROUNDING THE YEAR OF ANNOUNCEMENT

(A) AVERAGE VALUE OF ALPHA COMPUTED USING THREE YEARS OF DATA ENDING:

YEAR	YEAR -2	YEAR -1	YEAR 0	YEAR +1	YEAR +2	YEAR +3
1970	NA	NA	0.0008	0.0002	0.0024	-0.0014
1971	NA	-0.0002	0.0018	0.0052	0.0024	0.0009
1972	0.0005	0.0014	0.0036	0.0031	0.0011	-0.0001
1973	-0.0005	0.0023	0.0033	0.0027	0.0018	-0.0001
1974	0.0013	0.0021	0.0017	0.0022	0.0007	-0.0004
1975	0.0024	0.0017	0.0012	0.0004	0.0018	0.0011
1976	0.0001	-0.0002	0.0011	0.0011	0.0002	0.0003
1977	-0.0016	0.0005	0.0036	0.0012	-0.0007	0.0028
1978	0.0005	0.0021	0.0021	0.0019	0.0007	0.0013
1979	0.0016	0.0025	0.0046	0.0046	0.0042	0.0023
1980	0.0012	0.0026	0.0041	0.0026	0.0011	-0.0021
1981	0.0018	0.0027	0.0034	0.0021	-0.0003	NA
1982	0.0020	0.0026	0.0031	0.0016	NA	NA
1983	0.0024	0.0027	0.0017	NA	NA	NA
W'TD AVG	0.0010	0.0019	0.0027	0.0022	0.0011	0.0003

(B) AVERAGE VALUE OF BETA COMPUTED USING THREE YEARS OF DATA ENDING:

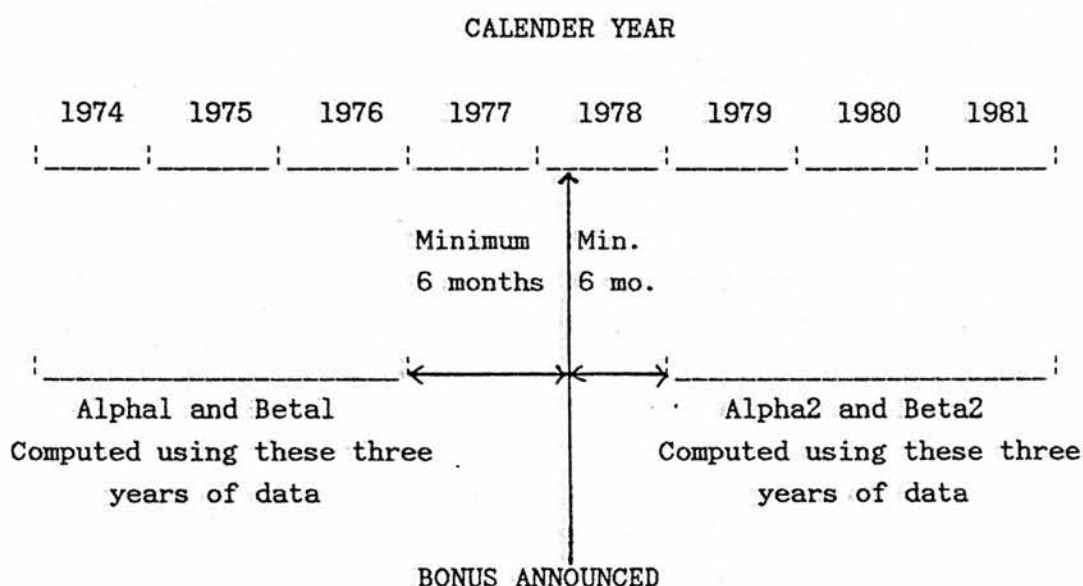
YEAR	YEAR -2	YEAR -1	YEAR 0	YEAR +1	YEAR +2	YEAR +3
1970	NA	NA	1.1702	1.1144	0.8014	1.0264
1971	NA	0.7377	1.0691	0.4844	0.8108	0.8202
1972	0.7059	1.1000	0.8877	0.9113	0.9139	0.8943
1973	0.9423	0.7669	0.7602	0.8375	0.8726	0.7988
1974	0.7442	0.7158	0.8058	0.8702	0.8705	0.9382
1975	0.5444	0.7016	0.6941	0.6909	0.6207	0.7802
1976	0.7960	0.6881	0.7834	0.7803	1.0091	0.9948
1977	0.8296	0.7856	0.6292	1.0898	0.9636	1.1211
1978	0.9023	0.8547	0.9299	0.9280	1.0555	1.0095
1979	0.6842	0.7817	0.7948	0.8382	0.8688	0.9141
1980	0.8736	0.8717	1.0250	1.2470	1.3039	1.1369
1981	0.9419	1.0871	1.0815	1.1284	0.9820	NA
1982	0.8955	1.0254	1.0405	0.9688	NA	NA
1983	0.9149	0.8919	0.8401	NA	NA	NA
W'TD AVG	0.8197	0.8529	0.8816	0.9242	0.9495	0.9484



The method for computing the "normalised" alphas and betas is designed after taking into consideration the very much shorter research period and the fact that the available alphas and betas are computed based on calendar years of data. A fixed 30 months "exclusion period" as used by FFJR is not practicable. The method used instead uses a variable length excluding period which excludes data for a minimum of 12 months (minimum of 6 before and after) surrounding the bonus announcements. The figure below shows diagrammatically how the normalised alpha and beta in respect of a share which announced a bonus issue on 31.3.78 are computed.

**FIGURE 8.4.1**

**METHOD FOR COMPUTING NORMALISED ALPHAS AND BETAS**



Normalised Alpha and Beta are respectively the average of:-  
 $(\text{Alpha1} + \text{Alpha2})$  and  $(\text{Beta1} + \text{Beta2})$

In the case of those bonus announcements which occurred at the two extremities of the research period, the above method is obviously not applicable. In these cases, the "normalised" alphas and betas are merely taken from the alphas and betas computed from the next or the previous "clean" block of data (again maintaining a separation of at least 6 months from the bonus announcement).

As a check on the efficacy of this method of normalising the alphas and betas, the mean value of the alphas and betas computed in the

following three ways are compared:-

	ALPHA	BETA
(1) GRAND MEAN OF ALL STOCKS FOR ALL YEARS	0.0005	0.8873
(2) MEAN OF ALL BONUS ISSUING STOCKS WITHOUT EXCLUSION	0.0027	0.8816
(3) MEAN OF ALL BONUS ISSUING STOCKS USING METHOD DESCRIBED ABOVE	0.0015	0.9285

It is not possible to say what the mean "true" alpha of stocks undergoing bonus issue is. It is possible that these stocks would have a higher alphas than the average of all stocks. Even in the unlikely case that this is the same as the grand mean of the alphas, we can say that this method of normalisation reduces the abnormality of alphas by more than half while at the same time it raises the value of the betas by a small extent (about 5%). (It is not possible to explain exactly why the process of normalisation raises the value of the betas. It appears this is due to the fact that the rate of increase in value of beta is less steep before the bonus announcement than after (please refer to Table 8.4.1). As a result, the averaging process introduces an upward bias.)

In the event that the true alphas and betas are lower than those used for the computation of the residuals, the true value of the residuals would be greater than those which are shown in Table 8.4.3. In this case, the picture of inefficiency uncovered would be further strengthened.

#### (B) SAMPLE

The sample of stocks is composed of all the stocks in the database. They are divided into five subsamples to permit a more indepth examination of the behavior of the market. The Average Residual (AR) and Cumulative Average Residual (CAR) for five separate subsamples of stocks under going bonus issues of "1 for 5" (a 1 for 5 bonus is equivalent to a 25% stock split) or greater (stocks which issued rights concurrently with bonus are excluded) are computed. The five subsamples are as follows:-

(A) All bonus issues made during the years 1968-1976;

- (B) All bonus issues made during the years 1977-1983;
- (C) All bonus issues with reduced or same dividend subsequent to the bonus issue announcements; and
- (D) All bonus issues with increased dividend subsequent to the bonus issue announcements; and
- (E) All bonus issues made during the research period.

The reason for not splitting the research period into two equal halves is that this way of splitting provides for a roughly similar number of bonus issues during the two halves (83 and 87).

#### 8.4.3 - RESULTS OF THE BONUS ISSUE TESTS

There were in all 170 "stand alone" (that is, those without a concurrent rights issue) bonus issues of greater than "1 for 5" during the research period. This is equivalent to about 2.62 bonus issues per company (the average number of companies in the database being 65) for 16 years or an average frequency of 0.163 bonus issue per company per year. This appears to be much more frequent than for companies listed on the NYSE. FFJR recorded 940 splits for all companies listed on the NYSE for 33 years. Assuming that the average number of listed companies was about 2,000 during this period; this would represent an average frequency of stock split of about 0.014 per company per year.

It would seem that Malaysian/Singaporean companies have a far greater propensity to undergo bonus issues than US companies making stock splits. Part of the reason for this could be due to the greater profit growth rate of the local companies over the last 10-15 years. Another possible reason for the greater number of bonus issues is that American companies have a greater tendency to make "large" stock splits - thus "two for one" splits are very common in the US. Malaysian companies tend to make a greater number of "small" splits.

The number of bonus issues for each of the five sub-samples which were separately examined are given below:-

(A) All bonus issues for years 1968-1976	83
(B) All bonus issues for years 1977-1983	87
(C) All bonuses with static or decreased dividend after bonus issue	56
(D) All bonus issues with increased dividend after bonus issue	114
(E) All bonus issues for years 1968-1983	170

The ratio of bonuses with increased dividend to total bonus differs in the two halves of the research period ( respectively 59% and 75%). This difference probably reflects the more bouyant business conditions of the second half of the research period. It is perhaps important to note this difference because it could provide part of the explanation for the different behavior of the stock return between the two halves of the research period.

The respective AR and CAR for each of the above sub-samples are computed and are given in Table 8.4.3 which is appended at the end of this section. In addition the CAR's are plotted using a commercial plotting programme and are appended to the end of this section as Figures 8.4.1 - A to E. (The various graphs are drawn to different scales.) Comparing these values with those obtained out by FFJR, It can be seen that the behavior of the CAR's appears very different from that uncovered by FFJR. The important findings of FFJR and the current test are summarised in Table 8.4.2 on the next page.

TABLE 8.4.2

## COMPARISON BETWEEN THE RESULTS OF FFJR AND CURRENT TEST

CHANGE IN VALUE OF CAR	FFJR	CURRENT TEST
(A) STOCKS WITH BONUS 1968-1976 (SUBSAMPLE A)		
(a) BETWEEN MONTH -12 TO MONTH -2	NA	+0.0038
(b) BETWEEN MONTH -2 TO MONTH 0	NA	+0.0853
(c) BETWEEN MONTH -12 TO MONTH 0	NA	+0.0891
(d) BETWEEN MONTH 0 AND MONTH +12	NA	-0.0502
(B) STOCKS WITH BONUS 1977-1983 (SUBSAMPLE B)		
(a) BETWEEN MONTH -12 TO MONTH -2	NA	+0.1185
(b) BETWEEN MONTH -2 AND MONTH 0	NA	+0.0814
(c) BETWEEN MONTH OF -12 TO MONTH 0	NA	+0.1999
(d) BETWEEN MONTH 0 AND MONTH +12	NA	-0.1053
(C) STOCKS WITH DIVIDEND "DECREASES" (SUBSAMPLE C)		
(a) BETWEEN MONTH -12 TO MONTH -2	+0.1373	+0.0120
(b) BETWEEN MONTH -2 TO MONTH 0	+0.0086	+0.0810
(c) BETWEEN MONTH -12 TO MONTH 0	+0.1459	+0.0930
(d) BETWEEN MONTH 0 AND MONTH +12	-0.0677	-0.1430
(D) STOCKS WITH DIVIDEND "INCREASES" (SUBSAMPLE D)		
(a) BETWEEN MONTH -12 TO MONTH -2	+0.2050	+0.0847
(b) BETWEEN MONTH -2 TO MONTH 0	+0.0330	+0.0844
(c) BETWEEN MONTH -12 TO MONTH 0	+0.2380	+0.1691
(d) BETWEEN MONTH 0 AND MONTH +12	+0.0286	-0.0457
(E) ALL BONUSES (SUBSAMPLE E)		
(a) BETWEEN MONTH -12 TO MONTH -2	+0.1859	+0.0605
(b) BETWEEN MONTH -2 TO MONTH 0	+0.0260	+0.0833
(c) BETWEEN MONTH -12 TO MONTH 0	+0.2119	+0.1438
(d) BETWEEN MONTH 0 AND MONTH +12	+0.0009	-0.0788

The results of the test reveals considerable departure from the findings of FFJR. The major differences between the findings are discussed below.

Firstly, the present test finds very little increase in the value of stocks upto Week -7 compared with the findings of FFJR. This is particularly so for bonuses issued during 1968-1976 (Subsample A) - increase in CAR of 0.0038 - and bonuses which are followed by dividend decreases (Subsample C) - increase in CAR of 0.0120 - between Week -50 and Week -7. Bonuses followed by dividend increase (Subsample D) and bonuses made during 1977-1983 (Subsample B) experience a much greater rise in CAR over the same period (respectively 0.1185 and 0.0844). In sharp contrast FFJR found that all their samples experienced sharp improvement in their CAR (of between 0.14 to 0.21) for the same period (i.e. Month -12 to Month -2).

Secondly, the CAR's of the current samples tend to spurt up steeply between about Week -6 to Week +2. The amount of movement experienced appears to be considerably larger than that uncovered by FFJR. The increase in the CAR is 0.0833 as against 0.026 (FFJR) for the "all stocks" case (Subsample E) for the two month period upto and including the announcement month. The consistency of the size of the advance of the CAR's during this period for all five subsamples is surprising (all of them having a value between 0.0810 to 0.0853)

Thirdly, in all cases, the CAR's trend downward soon after the announcements as against FFJR's finding whereby only stocks with decreased dividend suffered a declining CAR after announcement. The margin of decline is large in all cases. It is particularly large in the case of bonuses made during 1977-1983 (Subsample B) (-0.1205 between Week 5 and Week 50) and in the case of stocks with decreased dividend payment after the bonus issues (Subsample C) (-0.1442 between Week 1 and Week 50). Even Subsample D (dividend increases) suffers a decline in the CAR of -0.0425 as against an increase of 0.0286 in FFJR's sample). In the case of Subsample E (all stocks), the decline is -0.07712 as against a small increase of 0.0009.

It is also notable that there appears to be some difference in the behavior of stock prices between the two halves of the survey period. During the second half, the stock price behavior is a bit closer to the FFJR model in that there is a greater improvement in CAR (+0.1999



against +0.2119) in the twelve months preceding the announcements. The gain appears to be reasonably evenly spread out except for the last month. During the first half of the period, the total rise experienced is smaller (+0.0891) and much of that gain is obtained during the Week of -6 to Week +2.

#### 8.4.4 - DISCUSSION AND CONCLUSION

It would appear that the stock price behavior surrounding a bonus issue in Malaysia differs considerably from that of a US stock split. In this section, an attempt will be made to provide some explanations for this difference. A reiteration of the major conclusions reached by FFJR at this point would be useful. The following is a summary of their major conclusions:-

(1) Stock splits appear to be more the result of a period of abnormally good price performance rather than vice versa. That is, it appears that the management of a company tends to decide on a split after a period of abnormally good price performance;

(2) The market appears to have prior knowledge (from about Month -5) that a stock split is coming such that the price tends to move up more sharply than previously during Months -5 to Month -1. In other words, there appears to be some degree of speculative buying based on the prior knowledge of the impending stock split. As a result, at the time of the actual announcement, there is very little or zero price reaction; and

(3) The value of a stock split does not lie with the stock split per se but with the expectation that a stock undergoing a split will in future pay higher dividend. The market therefore expects a dividend increase to follow from a stock split. If there is no such increase, a decline in stock price can be expected. The amount of decline appears to be the same as what has been gained in the five months prior to the announcement (that is, gain based on speculation that a split is forthcoming).

#### THE APPLICABILITY OF FFJR'S CONCLUSIONS TO THE MALAYSIAN SITUATION

##### (A) GOOD PAST PERFORMANCE THE CAUSE OF STOCK SPLIT

A study of the movements of CAR after the announcement for the various subsamples in the current test is very revealing of the nature of the Malaysian market. All subsamples suffer a decline in the value of CAR from Week 0 to Week +50. For Subsample C, the decline in CAR relative to the gain made prior to announcement is especially sharp. By Week +50, its CAR stands at  $-0.05$  (as against  $+0.06$  just before the announcement). This performance stands in very marked contrast to the very good performance in the few weeks before and after the bonus announcements. Together with the fact that CAR experiences only small changes until about Week -7, this seems to imply a market behavior that is the completely different from the one postulated by FFJR.

The fact that the "benefit" of bonus announcement is so transient seems to strongly imply that a bonus announcement IN ITSELF has a certain amount of positive value. It is possible that a segment of the market has done some buying after receiving rumours or news of the impending bonus such as to produce the price increase noted. But the fact that the CAR should decline so sharply soon after the announcement must also imply that there is some selling pressure from some quarter. These two statements seem to be in contradiction unless the first group of investors (the "buyers") and the second group (the "sellers") are from mutually exclusive segments of the market.

While it is not possible to provide stronger evidence than this, this performance pattern strongly suggests the existence of a group of knowledgeable investors taking advantage of their superior information and the less knowledgeable investors' fascination with bonus issues. As mentioned in the introductory paragraph to this Section, the general belief that bonus issue is a "good thing" is very prevalent in Malaysia although such belief is hard to comprehend. Given such a scenario, it is possible that the knowledgeable investors could be the sellers after the bonus announcements for they are well aware that the bonus announcements per se should not have led to an increase in stock prices.

The behavior of Subsample C (that is, very sharp relative decline after the bonus announcement) further suggests that there indeed exists some knowledgeable investors who do take advantage of this mistaken belief and who take further advantage in wake of bonus announcement to "unload" heavily in respect of those stocks which in addition have poor future prospects.

## (B) MARKET HAS PRIOR KNOWLEDGE OF THE IMPENDING SPLIT

There is probably a qualitative difference between the gain made in the final weeks before an announcement and the period before that. From about Week -7 and after, the gain made in CAR is probably due to leakages (through corporate insiders or employees of the organisations connected with the bonus issues) of the definite news of an impending bonus announcement because by that time, the board of directors must have made the decision to issue a bonus and the announcement itself would be in preparation (printing of shareholders' circular, booking newspaper space etc). In term of discussion on market efficiency, the good performance that concerns us more is the improvement in the CAR made in the year or so before this final stage.

FFJR attributed the run-up in price in the several months prior to announcement to good market information. Such knowledge can be taken as a sign of efficiency since there is no gain to be made after the official announcement. Price behavior of Malaysian stocks surrounding bonus announcement also demonstrates a certain degree of prior knowledge in the market. However, such information appears to become general knowledge only much nearer to the time of the announcement. In all the subsamples, the greatest gain in the AR is attained during the week of the announcement or the week after (Week 0 or +1) with a certain amount of abnormal gain in the three weeks before and two weeks after the announcement. While in FFJR's sample, the greatest gain was attained in Month -2 (or at the average time of 7 weeks prior to announcement) with strong movements upward from about Month -4. This seems to imply that general knowledge of the news of the impending split/bonus perhaps occurs at different stages of the event horizon leading upto the announcement. It would appear that in the US, news of an impending stock split becomes general knowledge probably soon after the decision has been taken by the board of directors to split the stocks. In Malaysia it would appear that the news only become general knowledge very much later, probably only after the official announcement although there is some amount of leakage in the three to four weeks before the official announcement.

## (C) THE PERCEIVED VALUE OF A STOCK SPLIT IS IN THE EXPECTATION OF INCREASING FUTURE DIVIDEND

It does not appear feasible to uphold this conclusion of FFJR in respect of the Malaysian market. The strongest piece of evidence against it would be the fact that the CAR of all stocks, irrespectively of whether it pays a higher post bonus dividend or not, declines by roughly the same absolute margin. This fact appears to lend further support to the conjecture made earlier that the market is composed of two types of investors.

The less knowledgeable investors would only enter the market close to announcement time and buy on the rumour or news of the impending bonus. Their collective action would drive up the price from the level reached. However, the final part of the gain is not sustained by any real increase in the underlying value of the stock, and there are knowledgeable investors who are aware of this. As a result they would take the decision to sell after the announcement has been made. (This action would appear to follow the wellknown Wall Street adage to "buy on the rumour and sell on the news".) Since the final part of the price advance is irrational, all stocks making bonus issues would decline irrespectively of the type of changes in dividend payment after the bonus issues. Thus even stocks with dividend increase would suffer a decline in CAR. However, the decline of CAR relative to the gain previously made in respect of this class of stocks is smaller and the value of the CAR never becomes negative. This is in sharp contrast to the behavior of stocks with dividend decrease, the decline is twice the size of the gain made upto the point of announcement and the value of the CAR eventually drops well below zero.

This last point seems to imply a certain amount of efficiency even though the general picture is one of considerable inefficiency.

## CONCLUSION

On the balance of evidence, it is possible to make certain conclusions regarding the degree of efficiency with which the Malaysian market deals with information on bonus issues.

(1) There is strong prima facie evidence that the market as a whole does not treat information on bonus issues efficiently. The mere fact the CAR for all stocks decline after bonus announcement implies that there are possibilities for making abnormal gain. In addition, there is a sharp advance in the CAR for all subsamples just before and

after the bonus announcement apparently based purely on the news of the bonus itself. It is possible that this inefficiency arises in part because of last minute speculative buying based on the mistaken belief that bonuses per se will lead to enhanced share value.

(2) There is strong evidence that there may be two different types of investors involved in the trading of stocks surrounding bonus issues - the knowledgeable and the less knowledgeable. The former would base their investment decision making on the perceived value of the stocks while the latter base their investment decision not specifically on the earnings/dividend prospect of the company but rather on the belief that bonus issue would enhance the value of the underlying stocks. It would seem that the knowledgeable investors have been exploiting their superior position to make abnormal profit off the less knowledgeable investors.

(3) There is some evidence that the market has become slightly more efficient over the research period in that the market appears to have greater prior knowledge of impending bonus issues, and that the decline in CAR subsequent to a bonus announcement appears to have become less pronounced.

FIGURE 8.42-(A) ALL BONUSES 1968-1976

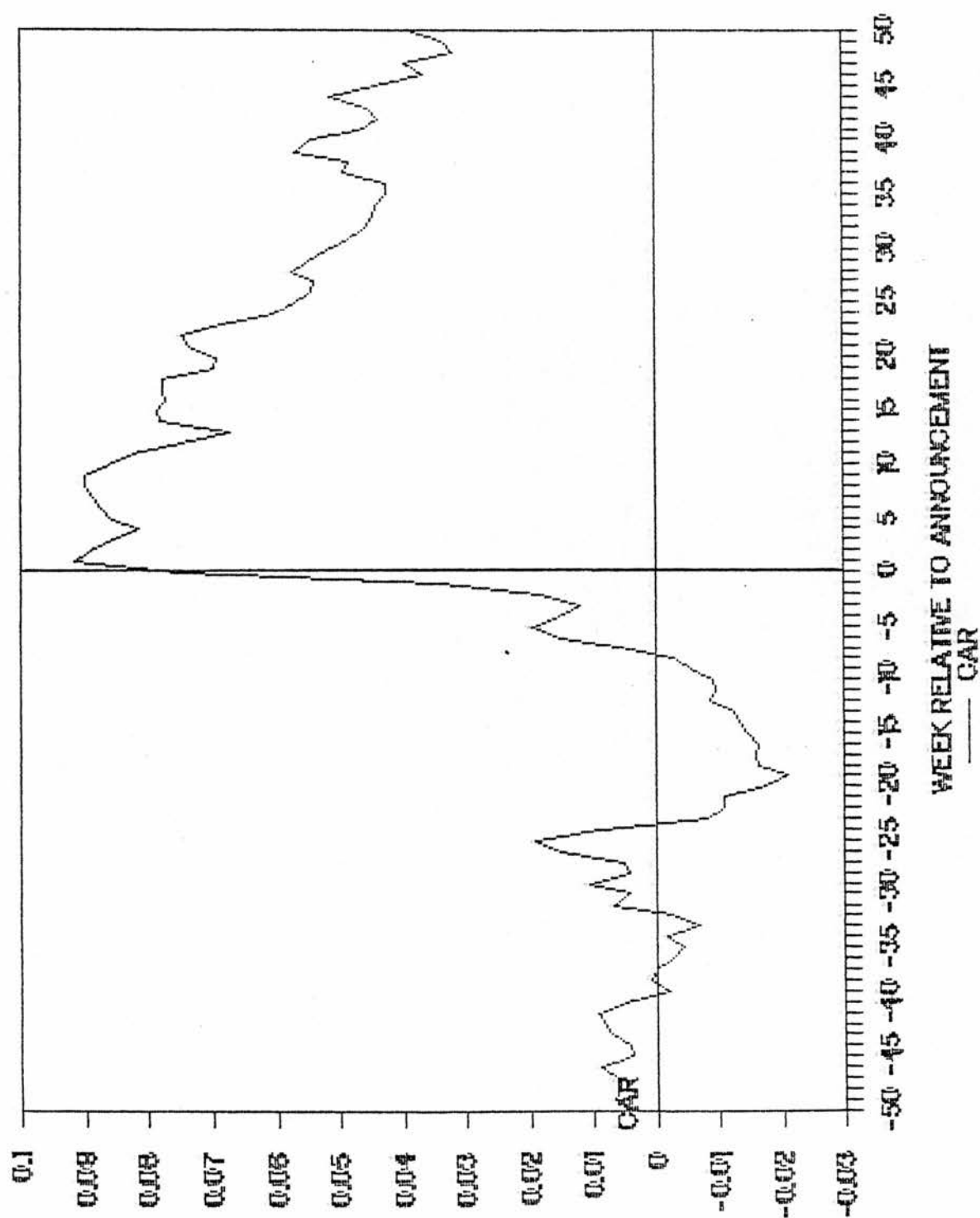




FIGURE 8.4.2-(B) ALL BONUSES 1977-1983

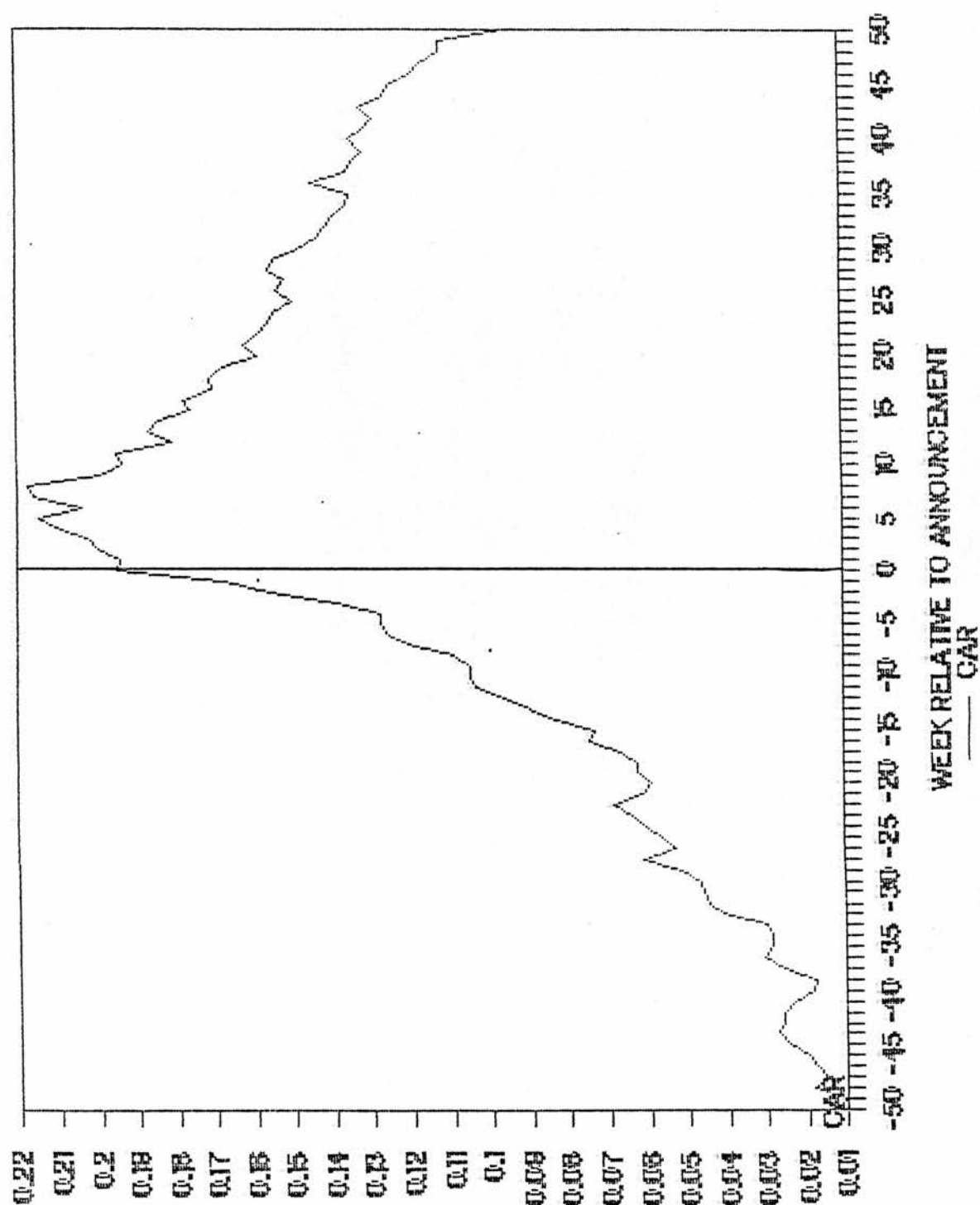


FIGURE 0.4P-(C) BONUSES-DIV. DECREASE

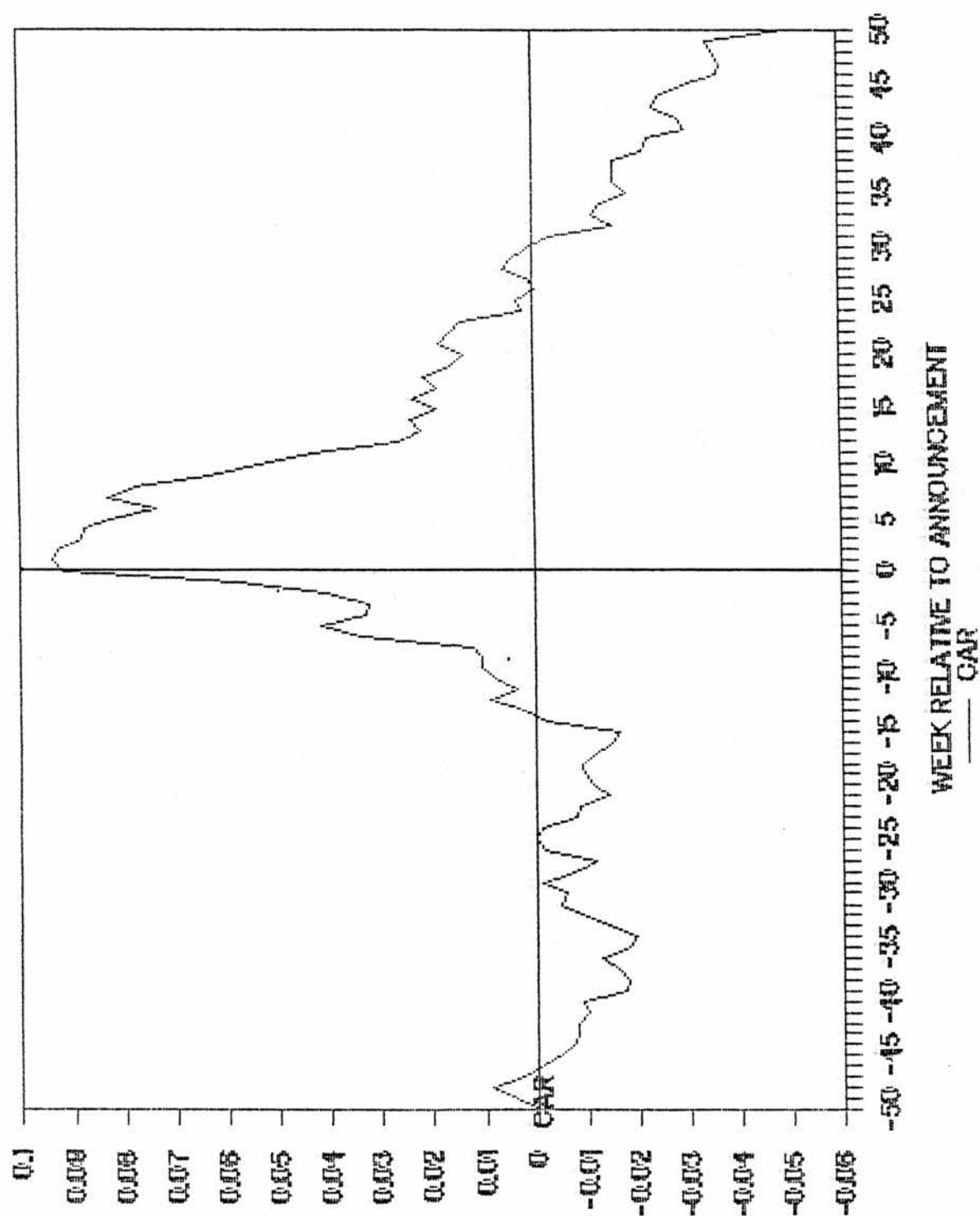


FIGURE 0.4.2-(D) BONUSES-DIV. INCREASE

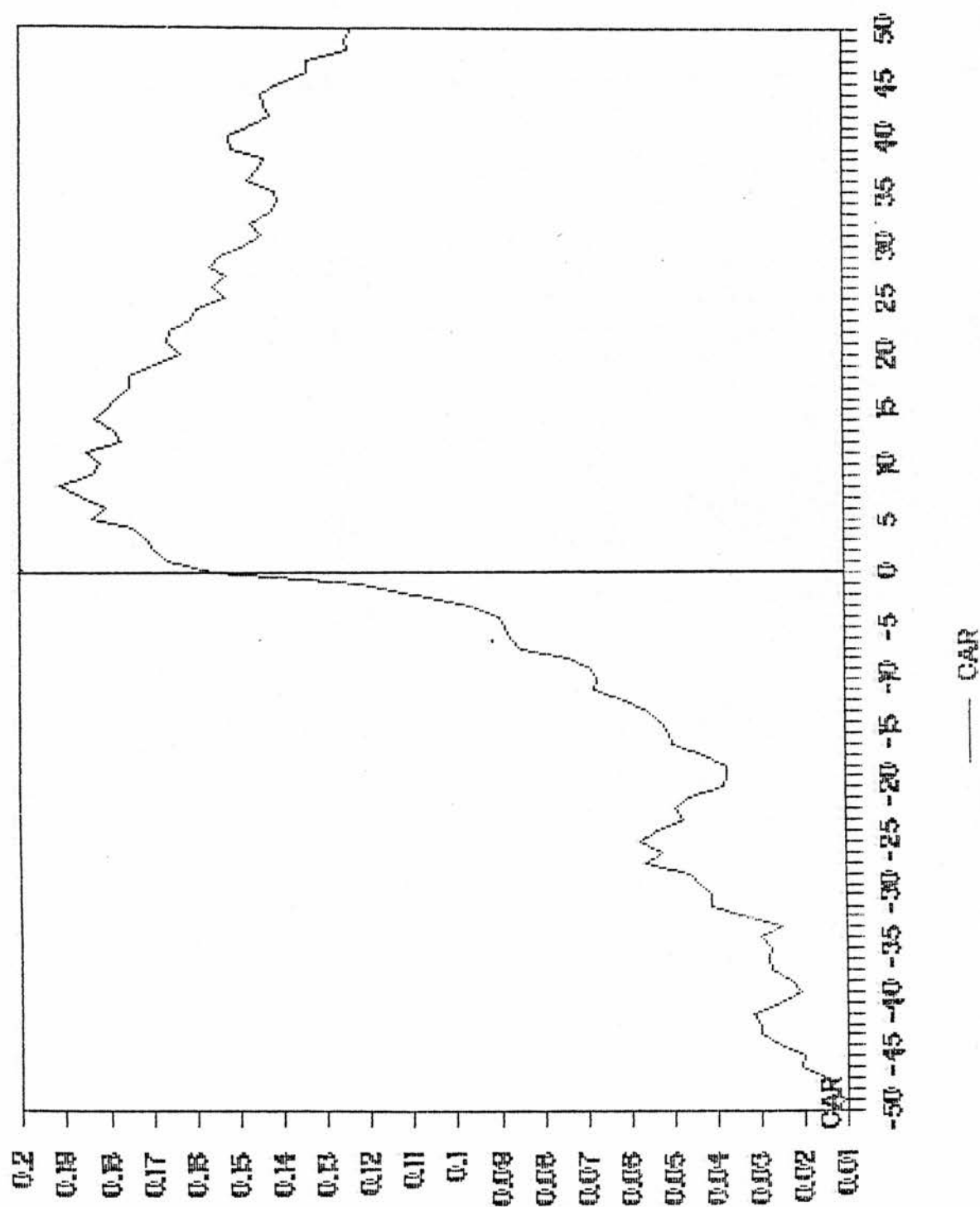


FIGURE 0.42-(E) ALL BONUSES 1960-1963

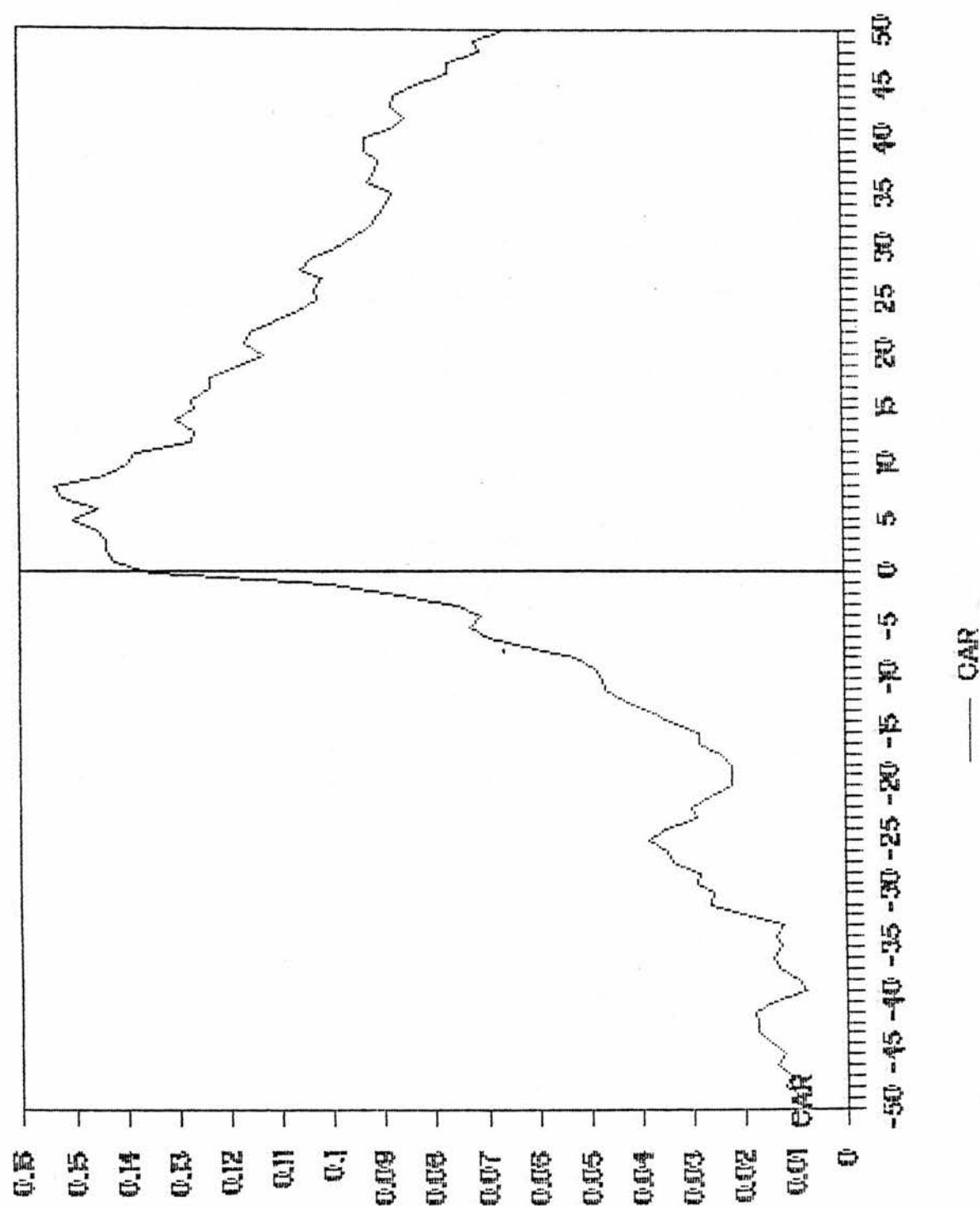


TABLE 8.4.3 - A

WEEK REL. TO BONUS	SUBSAMPLE A		SUBSAMPLE B		SUBSAMPLE C		SUBSAMPLE D		SUBSAMPLE E	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR	AR	CAR
-50	0.00440	0.00440	0.01372	0.01372	-0.00093	-0.00093	0.01421	0.01421	0.00919	0.00919
-49	0.00219	0.00658	-0.00320	0.01051	0.00516	0.00424	-0.00343	0.01077	-0.00059	0.00861
-48	-0.00069	0.00590	0.00810	0.01861	0.00447	0.00870	0.00352	0.01430	0.00384	0.01244
-47	0.00052	0.00641	-0.00333	0.01528	-0.00628	0.00243	0.00092	0.01522	-0.00147	0.01098
-46	0.00251	0.00892	0.00275	0.01803	-0.00352	-0.00109	0.00568	0.02090	0.00263	0.01361
-45	-0.00520	0.00372	0.00198	0.02001	-0.00369	-0.00478	-0.00042	0.02048	-0.00150	0.01211
-44	0.00056	0.00428	0.00471	0.02471	-0.00253	-0.00732	0.00529	0.02576	0.00269	0.01480
-43	0.00268	0.00696	0.00251	0.02723	-0.00068	-0.00800	0.00421	0.02998	0.00259	0.01739
-42	0.00118	0.00814	-0.00134	0.02588	-0.00001	-0.00801	-0.00017	0.02980	-0.00012	0.01727
-41	0.00109	0.00923	0.00057	0.02645	-0.00183	-0.00983	0.00214	0.03194	0.00082	0.01810
-40	-0.00421	0.00502	-0.00325	0.02320	0.00099	-0.00884	-0.00605	0.02589	-0.00372	0.01438
-39	-0.00738	-0.00236	-0.00499	0.01821	-0.00836	-0.01720	-0.00506	0.02084	-0.00615	0.00823
-38	0.00320	0.00084	-0.00042	0.01779	-0.00079	-0.01799	0.00239	0.02323	0.00134	0.00957
-37	-0.00084	0.00000	0.00807	0.02586	0.00239	-0.01561	0.00442	0.02765	0.00375	0.01331
-36	-0.00259	-0.00258	0.00494	0.03080	0.00291	-0.01269	0.00048	0.02813	0.00129	0.01460
-35	-0.00194	-0.00453	-0.00187	0.02893	-0.00544	-0.01813	-0.00015	0.02797	-0.00191	0.01269
-34	0.00260	-0.00193	-0.00027	0.02866	-0.00135	-0.01948	0.00234	0.03032	0.00112	0.01381
-33	-0.00476	-0.00669	0.00175	0.03040	0.00558	-0.01390	-0.00487	0.02544	-0.00141	0.01240
-32	0.00384	-0.00285	0.01098	0.04138	0.00497	-0.00893	0.00878	0.03422	0.00752	0.01992
-31	0.00973	0.00687	0.00307	0.04445	0.00405	-0.00488	0.00741	0.04163	0.00630	0.02622
-30	-0.00275	0.00412	0.00165	0.04610	-0.00087	-0.00575	-0.00030	0.04133	-0.00049	0.02573
-29	0.00630	0.01041	0.00034	0.04643	0.00478	-0.00097	0.00246	0.04379	0.00323	0.02896
-28	-0.00628	0.00414	0.00481	0.05124	-0.00648	-0.00746	0.00236	0.04615	-0.00057	0.02838
-27	0.00098	0.00512	0.00958	0.06081	-0.00417	-0.01162	0.01015	0.05630	0.00541	0.03379
-26	0.01031	0.01543	-0.00792	0.05289	0.00987	-0.00175	-0.00351	0.05279	0.00092	0.03472
-25	0.00373	0.01916	0.00366	0.05655	0.00144	-0.00031	0.00481	0.05760	0.00369	0.03841
-24	-0.01043	0.00873	0.00423	0.06079	-0.00069	-0.00101	-0.00396	0.05364	-0.00288	0.03553
-23	-0.01684	-0.00811	0.00317	0.06396	-0.00705	-0.00806	-0.00629	0.04735	-0.00654	0.02899
-22	-0.00253	-0.01064	0.00491	0.06887	-0.00047	-0.00853	0.00218	0.04953	0.00130	0.03029
-21	0.00007	-0.01058	-0.00774	0.06113	-0.00555	-0.01407	-0.00316	0.04636	-0.00395	0.02634
-20	-0.00671	-0.01729	-0.00226	0.05887	0.00318	-0.01090	-0.00819	0.03818	-0.00442	0.02192
-19	-0.00357	-0.02086	0.00372	0.06259	0.00153	-0.00937	-0.00048	0.03769	0.00018	0.02210
-18	0.00461	-0.01624	0.00000	0.06259	0.00048	-0.00888	0.00000	0.03769	0.00000	0.02210
-17	0.00034	-0.01591	0.00419	0.06678	-0.00277	-0.01165	0.00480	0.04250	0.00231	0.02441
-16	-0.00049	-0.01640	0.00822	0.07499	-0.00294	-0.01459	0.00736	0.04985	0.00396	0.02837
-15	0.00188	-0.01452	-0.00170	0.07329	-0.00203	-0.01662	0.00106	0.05092	0.00005	0.02842
-14	0.00145	-0.01307	0.00949	0.08278	0.01417	-0.00245	0.00134	0.05226	0.00556	0.03398
-13	0.00068	-0.01239	0.00684	0.08962	0.00458	0.00212	0.00347	0.05572	0.00383	0.03782
-12	0.00396	-0.00843	0.00641	0.09603	0.00642	0.00855	0.00462	0.06034	0.00521	0.04303
-11	-0.00096	-0.00940	0.00779	0.10382	-0.00514	0.00341	0.00777	0.06811	0.00352	0.04655
-10	0.00046	-0.00894	0.00153	0.10535	0.00419	0.00760	-0.00056	0.06755	0.00101	0.04755
-9	0.00354	-0.00540	-0.00051	0.10483	0.00250	0.01010	0.00096	0.06851	0.00147	0.04902
-8	0.00223	-0.00317	0.00459	0.10943	0.00026	0.01036	0.00500	0.07350	0.00344	0.05245
-7	0.00695	0.00378	0.00911	0.11853	0.00167	0.01204	0.01119	0.08469	0.00805	0.06051
-6	0.01093	0.01471	0.00682	0.12535	0.02203	0.03406	0.00234	0.08703	0.00883	0.06933
-5	0.00489	0.01960	0.00245	0.12780	0.00781	0.04187	0.00159	0.08862	0.00364	0.07297
-4	-0.00432	0.01527	-0.00006	0.12774	-0.00918	0.03268	0.00132	0.08994	-0.00214	0.07083
-3	-0.00350	0.01177	0.01118	0.13892	-0.00060	0.03209	0.00628	0.09622	0.00401	0.07484
-2	0.00633	0.01810	0.01666	0.15558	0.00875	0.04084	0.01302	0.10924	0.01161	0.08646
-1	0.01582	0.03392	0.01201	0.16758	0.01684	0.05768	0.01241	0.12165	0.01387	0.10032

TABLE 8.4.3 - B

WEEK REL. TO BONUS	SUBSAMPLE A		SUBSAMPLE B		SUBSAMPLE C		SUBSAMPLE D		SUBSAMPLE E	
	AR	CAR	AR	CAR	AR	CAR	AR	CAR	AR	CAR
0	0.04106	0.07497	0.02747	0.19505	0.03397	0.09165	0.03417	0.15581	0.03410	0.13443
1	0.01662	0.09159	-0.00094	0.19411	0.00250	0.09414	0.01015	0.16597	0.00763	0.14206
2	-0.00254	0.08905	0.00577	0.19988	-0.00116	0.09299	0.00312	0.16909	0.00171	0.14377
3	-0.00347	0.08558	0.00272	0.20260	-0.00471	0.08828	0.00186	0.17095	-0.00030	0.14347
4	-0.00406	0.08152	0.00810	0.21070	-0.00073	0.08755	0.00359	0.17453	0.00217	0.14563
5	0.00424	0.08576	0.00432	0.21502	-0.00502	0.08254	0.00885	0.18338	0.00428	0.14991
6	0.00158	0.08734	-0.01103	0.20399	-0.00904	0.07350	-0.00286	0.18052	-0.00491	0.14500
7	0.00117	0.08851	0.01212	0.21611	0.00962	0.08311	0.00541	0.18593	0.00681	0.15181
8	0.00149	0.08999	0.00152	0.21763	-0.00540	0.07771	0.00492	0.19086	0.00150	0.15331
9	0.00016	0.09015	-0.01879	0.19884	-0.01474	0.06297	-0.00705	0.18381	-0.00960	0.14371
10	-0.00381	0.08634	-0.00512	0.19372	-0.00927	0.05370	-0.00211	0.18170	-0.00448	0.13923
11	-0.00406	0.08228	0.00087	0.19459	-0.01023	0.04347	0.00279	0.18449	-0.00152	0.13771
12	-0.00774	0.07454	-0.01387	0.18072	-0.01726	0.02621	-0.00774	0.17675	-0.01090	0.12681
13	-0.00733	0.06722	0.00615	0.18687	-0.00454	0.02167	0.00167	0.17842	-0.00039	0.12642
14	0.01078	0.07800	-0.00318	0.18370	0.00199	0.02366	0.00439	0.18281	0.00360	0.13002
15	0.00060	0.07859	-0.00769	0.17601	-0.00479	0.01887	-0.00311	0.17970	-0.00367	0.12635
16	-0.00143	0.07716	0.00179	0.17780	0.00432	0.02319	-0.00180	0.17790	0.00023	0.12658
17	0.00068	0.07784	-0.00746	0.17034	-0.00463	0.01855	-0.00295	0.17495	-0.00351	0.12307
18	0.00000	0.07784	0.00078	0.17112	0.00285	0.02140	0.00000	0.17495	0.00000	0.12307
19	-0.00807	0.06977	-0.00332	0.16779	-0.00514	0.01626	-0.00582	0.16912	-0.00560	0.11747
20	-0.00046	0.06931	-0.00935	0.15844	-0.00267	0.01359	-0.00625	0.16287	-0.00506	0.11241
21	0.00428	0.07359	0.00325	0.16170	0.00475	0.01835	0.00325	0.16612	0.00375	0.11615
22	0.00105	0.07464	-0.00295	0.15874	-0.00199	0.01636	-0.00054	0.16557	-0.00102	0.11513
23	-0.00612	0.06852	-0.00275	0.15599	-0.00265	0.01371	-0.00523	0.16034	-0.00438	0.11075
24	-0.00811	0.06041	-0.00161	0.15438	-0.01196	0.00175	-0.00117	0.15918	-0.00476	0.10599
25	-0.00334	0.05707	-0.00443	0.14995	0.00128	0.00303	-0.00650	0.15268	-0.00390	0.10209
26	-0.00265	0.05442	0.00367	0.15362	-0.00392	-0.00089	0.00287	0.15555	0.00061	0.10269
27	-0.00071	0.05371	-0.00213	0.15149	0.00157	0.00068	-0.00295	0.15261	-0.00144	0.10125
28	0.00372	0.05743	0.00408	0.15557	0.00514	0.00582	0.00329	0.15589	0.00391	0.10516
29	-0.00259	0.05484	-0.00117	0.15440	-0.00185	0.00397	-0.00186	0.15403	-0.00186	0.10330
30	-0.00320	0.05164	-0.00640	0.14800	-0.00321	0.00076	-0.00567	0.14836	-0.00485	0.09845
31	-0.00323	0.04841	-0.00420	0.14380	-0.00387	-0.00311	-0.00366	0.14470	-0.00373	0.09472
32	-0.00273	0.04568	-0.00272	0.14107	-0.01273	-0.01583	0.00228	0.14697	-0.00273	0.09199
33	-0.00110	0.04458	-0.00202	0.13906	0.00402	-0.01181	-0.00437	0.14260	-0.00157	0.09042
34	-0.00069	0.04389	-0.00292	0.13614	-0.00146	-0.01327	-0.00202	0.14058	-0.00183	0.08859
35	-0.00143	0.04247	-0.00087	0.13527	-0.00517	-0.01843	0.00087	0.14145	-0.00114	0.08745
36	0.00002	0.04249	0.00949	0.14475	0.00249	-0.01594	0.00610	0.14755	0.00490	0.09234
37	0.00650	0.04899	-0.00895	0.13581	0.00017	-0.01577	-0.00227	0.14528	-0.00146	0.09089
38	-0.00050	0.04849	-0.00105	0.13476	0.00018	-0.01559	-0.00126	0.14402	-0.00078	0.09011
39	0.00851	0.05700	-0.00269	0.13207	-0.00603	-0.02162	0.00709	0.15111	0.00277	0.09288
40	-0.00272	0.05428	0.00288	0.13495	-0.00114	-0.02276	0.00078	0.15189	0.00015	0.09303
41	-0.00757	0.04671	-0.00291	0.13204	-0.00728	-0.03004	-0.00416	0.14774	-0.00518	0.08784
42	-0.00302	0.04369	-0.00297	0.12907	0.00138	-0.02866	-0.00515	0.14259	-0.00300	0.08485
43	0.00182	0.04551	0.00325	0.13232	0.00496	-0.02369	0.00137	0.14396	0.00255	0.08740
44	0.00588	0.05139	-0.00584	0.12648	-0.00116	-0.02486	0.00045	0.14441	-0.00009	0.08731
45	-0.00742	0.04397	-0.00155	0.12492	-0.00474	-0.02960	-0.00428	0.14013	-0.00443	0.08288
46	-0.00738	0.03659	-0.00523	0.11970	-0.00686	-0.03646	-0.00600	0.13413	-0.00628	0.07659
47	0.00277	0.03936	-0.00308	0.11662	-0.00037	-0.03683	-0.00013	0.13400	-0.00021	0.07639
48	-0.00735	0.03201	-0.00447	0.11215	0.00158	-0.03524	-0.00958	0.12442	-0.00588	0.07051
49	0.00153	0.03354	-0.00029	0.11186	0.00096	-0.03429	0.00043	0.12485	0.00060	0.07111
50	0.00536	0.03890	-0.01728	0.09457	-0.01576	-0.05005	-0.00142	0.12343	-0.00617	0.06494



## 8.5 - Test to Uncover the Market's Use of Earnings Information

### 8.5.1 - BACKGROUND TO THE TEST

This test is based on the original conceptual framework first developed by Ball and Brown (1968) (BB), although the actual method will be largely based on more modern developments of BB's work. The basis of the test was the idea that the Western securities markets appear to possess an expectation of the level of earnings per share a stock ought to have. If the actual earnings were to deviate considerably from this level, the market price is likely to react in the direction of the deviation. The difference between the expected EPS and the actual EPS is known as the Earnings Forecast Error and as a result these tests are also known as the Earnings Forecast Error (EFE) tests.

In BB's test, the earnings forecasts were developed by regressing past earnings upon the GNP on an annual basis. The stocks in the sample are divided into two groups according to whether they have undergone a positive or negative earnings forecast error. The average performance of each group for 12 months before and after the announcement was recorded. BB developed the API technique for examining the abnormal performance of the stocks involved. Their API technique is conceptually very similar to the CAR technique developed by Fama Jensen Fisher and Roll (1969) (FFJR). From the Abnormal Performance Index so developed, Ball and Brown concluded that the market was highly efficient because the informational content of the earnings forecast errors appeared to be already known to the market well before the announcement and the prices of the stocks had already moved as much as they were ever going to by the time of the announcement.

Later workers, in particular, Brown and Kennelly (1972), Joy, Litzenberger and McEnally (1977) (JLM) and Beaver Clarke and Wright (1979) (BCW) carried on this line of work with several major modifications to the method of BB. An extensive discussion of the more recent works on earnings information has been provided under Section 4.3.1 and there is little need to repeat the discussion here.

It suffices to reproduce below the conclusions reached at the end of that discussion:-

- (1) The market seems to have a prior expectation of what the forthcoming EPS figure for each listed firm ought to be;
- (2) In addition to having a prior expectation of what a firm's EPS ought to be, the market seems to "know" in advance (the exact extent of this "knowledge" is in dispute) if the firm is going to experience an increase or decrease in earnings from the "ought to be" level and the price of the stock would have moved considerably in the direction of the eventual earnings change well before the announcement ;
- (3) A good facsimile of the market's earnings expectations can be developed from fairly simple method/s;
- (4) If the actual EPS figure differs considerably from what had been expected, there is a further price reaction in the direction of the forecast error in addition to the previous movement; and
- (5) The reaction is not instantaneous, taking up to 26 weeks to take full effect (again this point is in dispute).

Among the work cited earlier, BCW is the most recent and is the most extensive. It is therefore decided to adopt the methodology of this work for the present test. BCW's main purpose does not appear to be so much to prove or disprove the EMH. Rather, the authors' main purpose appears to show that ".....a positive ordinal association exists between unsystematic returns and the magnitude of earnings forecast errors". BCW tested two different earnings forecast models and two different methods of measuring forecast errors resulting in four replications of the test. BCW found a highly significant correlation between the magnitude of EFE and the size of unsystematic return in the year leading upto to the earnings announcement. Interestingly, all four replications of the test produced very similar results. This seems to imply that the test method is not very sensitive to changes in methodology.

### 8.5.2 - METHOD AND SAMPLE

#### (A) Modifications to BCW's Methodology

Owing to the differences in emphasis, environment and available resources, several major and minor modifications to BCW's methodology are made. These are:-

- (1) The unsystematic returns are tracked after the forecasts have been made rather than before;
- (2) Only one forecasting model is used and one method of computing forecast errors;
- (3) A modified version of forecasting model is used; and
- (4) The securities are studied individually rather than grouped into portfolios.

**Period For Recording Unsystematic Return** (Inline with the rest of this thesis, the term "return residual" is used in preference to "unsystematic return".) As the emphasis of this dissertation is to uncover possible inefficiencies which exist in the Malaysian market, instead of recording the return residuals for the 12 months upto the point of the earnings announcement, this test will record the cumulated return residual (CRR) for each stock at six months and one year after the earnings forecast has been made (As will be shown later, this is not the same point in time as the earnings announcement). In this sense, this test is closer in spirit to the one performed by JLM.

**One Forecasting Model and One Method of Computing EFE Is Used As** BCW could show very little difference between the four replications of the tests performed and given the finite resources available, it is therefore decided to use a single model and a single method of computing the EFE. The model of forecasting used is very similar to BCW's Model B and the method of computing EFE is what BCW called the Percentage Forecast Error.

**Modified Version of BCW's Forecasting Model Used** BCW's earnings forecast model is based on the following equations:-

$$f(\text{EPS}_{it}) = \text{EPS}_{i(t-1)} + \hat{\gamma}_{1,t,(t-1)} + \hat{\gamma}_{2,i,(t-1)} \Delta \text{EPS}_{mt}$$

$$f(\Delta \text{EPS}_{it}) = \hat{\gamma}_{1,i,(t-1)} + \hat{\gamma}_{2,i,(t-1)} \Delta \text{EPS}_{mt}$$

Where  $\text{EPS}_{i,t}$  = Earnings Per Share for the  $i$ th stock for the year  $t$   
 $\text{EPS}_{mt}$  = Average EPS for the year  $t$   
 $\gamma_1, \gamma_2$  are Estimates obtained by OLS regression of  $\Delta \text{EPS}_i$  on  $\Delta \text{EPS}_m$  for all years of data through year  $(t-1)$

From the above equation, it can be seen that BCW forecasting model is based on the relationship between changes in individual EPS ( $\Delta \text{EPS}_{it}$ ) and changes in average EPS ( $\Delta \text{EPS}_{mt}$ ). Given that the Malaysian economy is largely commodities based, the EPS of firms tend to fluctuate a great deal. Owing to differences in the earnings cycles of different firms, there appears to be little relationship between the changes in individual EPS and the changes in the average EPS. A random sample of 30 firms was chosen and a comparison made between the relationship of the individual EPS ( $\text{EPS}_{it}$ ) and average EPS ( $\text{EPS}_{mt}$ ) as well as the relationship between changes in individual EPS and changes in the average EPS (using all the available data for each firm). This investigation reveals that under the Malaysian conditions, the regression of  $\Delta \text{EPS}_{it}$  on  $\Delta \text{EPS}_{mt}$  produces an average coefficient of determination of only 0.1690. In sharp contrast the regression of  $\text{EPS}_{it}$  on  $\text{EPS}_{mt}$  produces an average coefficient of determination of 0.6026. It is therefore decided to adopt the following model for forecasting purposes:-

$$f(\text{EPS}_{it}) = \hat{a}_{i,(t-1)} + \hat{b}_{i,(t-1)} \text{EPS}_{mt}$$

The Earnings Forecast Ratio (EFR) is the derived from:-

$$\text{EFR}_{it} = \frac{\text{EPS}_{it}}{f(\text{EPS}_{it})}$$

This is a slight modification of what BCW called Percentage Forecast Error which is given by the equation:-

$$e_{pit} = \frac{\Delta \text{EPS}_{it} - f(\Delta \text{EPS}_{it})}{f(\Delta \text{EPS}_{it})}$$

In BCW's test, small earnings forecast errors were omitted in order to

avoid the problem of having very large forecast errors as earnings forecast tends to zero. In the current test, these data are included owing to the smaller size of sample. As a result outliers with extreme value exists. As the significance test will use rank rather than actual value, the existence of outliers should not be a problem.

#### (B) THE ACTUAL METHOD DESCRIBED

An example of the actual worksheet for performing the test is included as Exhibit 8.4.1 attached to the end of this section. The first step consists of computing the 12-month Adjusted Earnings Per Share Before Tax (hereafter known as EPS for short) stream for each stock in the database (except those with less than 6 years of earnings record) once every six months for the whole of the research period. The calendar year is used rather than the fiscal year unlike BCW because of the lack of uniformity in the earnings announcement dates (the length of time between fiscal year end and earnings announcement can vary from 2 months to nine or even longer). The Average EPS is computed once every six months based on the all the announced results made during the previous six months.

The second step is to carry out OLS regression for every EPS stream on the Average EPS. The regression is first carried out for the year ending December 31, 1973 for all stocks with a minimum of 6 earnings announcements. Thereafter, it is done once at the end of every calendar year with all the available data for each stock included. Estimates for  $a$  and  $b$  for each stock for each of the years of 1973 to 1982 are therefore derived.

The third step is to produced an earnings "forecast" for each stock in respect of the earnings announcement which is being made during the first six calendar months of a given year. This "forecast" is computed from the estimated individual  $a$  and  $b$  in respect of the last regression made at the end of the previous calendar year and the Average EPS computed from the earnings announcements made in the first 6 months of the current calendar year. That is, the EPS forecast for June 1974 is made using the  $a$  and  $b$  derived from regression on data upto December 1973 and the Average EPS for June 1974. This computational step is inline with BCW's methodology. In so far as most of the stocks have their fiscal year-end in June or December, a majority of the stocks would make either their interim or final earnings announcement between Febuary and June, the "median"

being about the end of April. As a result, by the time the "forecast" is made, it is on average two months after the new earnings figures become generally available.

The fourth step is to compute the Earning Forecast Ratio (EFR) which is derived by dividing the actual EPS by the forecasted EPS. Hence a low figure would denote a negative EFE under the schema of BCW. For a stock with an unbroken earnings stream throughout the research period, it would be possible to produce in all 10 EFR for the period June 1974 to June 1983. As not all stocks have such complete record, the number of EFR per year for this test varies from 39 to 72.

The last step is to record the Cumulated Return Residual (CRR) for each stock for the 6-month and one-year periods after every earnings forecast has been made. That is, for an earnings forecast made at the end of June 1974, the CRR for that stock would be recorded for the period July 1974 to December 1974 and July 1974 to June 1975. The return residual is computed using the technique pioneered by FFJR as previously described in Chapter Three. As previously mentioned in Chapter Six, throughout this dissertation this is the method used whenever unsystematic returns have to be computed.

#### (C) Statistical Properties Of Earnings Forecast Ratios and Cumulative Return Residuals

The frequency distributions in respect of the Earnings forecast Ratios and the Six-month and One-year Cumulative Return Residuals are provided in Tables 8.5.1 and 8.5.2 appended below to afford a comparison with BCW's findings. The means and standard deviations for these distributions are left out as it is felt that they do not provide any useful extra information in view of the extreme outliers problem mentioned earlier.



TABLE 8.5.1

## FREQUENCY DISTRIBUTION OF EFR

	PERCENTILE				
	20	40	50	60	80
1974	0.87	0.95	1.03	1.13	1.57
1975	0.55	0.86	0.89	0.96	1.22
1976	0.55	0.96	1.08	1.18	1.38
1977	0.73	0.96	1.07	1.10	1.35
1978	0.59	0.84	0.96	1.06	1.25
1979	0.80	0.96	1.00	1.03	1.21
1980	0.83	0.90	0.95	1.03	1.29
1981	0.80	0.92	0.98	1.07	1.39
1982	0.57	0.84	0.96	1.14	1.51
1983	0.52	0.88	1.06	1.23	1.52
MEAN	0.68	0.91	1.00	1.09	1.37

TABLE 8.5.2

## FREQUENCY DISTRIBUTION OF RESIDUAL RETURN

(A) SIX MONTHS AFTER FORECAST

	PERCENTILE				
	20	40	50	60	80
1974	-0.2222	-0.0707	0.0011	0.0290	0.0767
1975	-0.1683	-0.0614	-0.0134	-0.0052	0.0959
1976	-0.0694	-0.0138	0.0108	0.0613	0.1510
1977	-0.0869	-0.0255	-0.0053	0.0075	0.1074
1978	-0.1377	-0.0551	-0.0168	0.0149	0.0787
1979	-0.1041	-0.0128	0.0083	0.0391	0.1362
1980	-0.1441	-0.0588	-0.0080	0.0240	0.1626
1981	-0.1485	-0.0458	-0.0175	0.0086	0.0852
1982	-0.1778	-0.0613	-0.0399	-0.0251	0.0975
1983	-0.1668	-0.0714	-0.0446	-0.0204	0.0602
MEAN	-0.1426	-0.0478	-0.0127	0.0130	0.1051

TABLE 8.5.2 (contd)

(B) ONE YEAR AFTER FORECAST

	PERCENTILE				
	20	40	50	60	80
1974	-0.2498	-0.1187	-0.0910	-0.0353	0.1271
1975	-0.2453	-0.1148	-0.0792	-0.0300	0.0996
1976	-0.1315	-0.0229	0.0109	0.0840	0.2099
1977	-0.1806	-0.0422	0.0279	0.0710	0.2126
1978	-0.1494	-0.0220	-0.0007	0.0329	0.1244
1979	-0.1421	-0.0187	0.0092	0.0839	0.2004
1980	-0.2247	-0.1025	-0.0257	0.0672	0.2327
1981	-0.3568	-0.0735	-0.0347	0.0453	0.1353
1982	-0.2453	-0.0809	0.0140	0.0500	0.1851
MEAN	-0.2139	-0.0662	-0.0188	0.0410	0.1697

The forecast errors appear to be considerably larger than those recorded by BCW. It is interesting to note that the EFR are distributed almost symmetrically about their medians. It is not possible to compare the distribution of the cumulative return residual as BCW only provides the grouped distribution. In so far as it is possible to judge; the cumulative return residuals appear to be considerably larger too after adjusting the data to the same units.

### 8.5.3 - RESULTS AND DISCUSSION

The EFR and the CRR in respect of all the stocks for each of the forecast period are tested for significance using Spearman Rank-Order Correlation. Given that the sample is large, the approximation to the t-distribution is used to compute the significance probabilities. Table 8.5.3 below provides the Spearman correlation coefficients, the t-values and the significance probabilities for the period 1974 to 1983 (1982 for the one-year CRR).

## SPEARMAN CORRELATION BETWEEN EFR AND RETURN RESIDUALS

## (A) SIX MONTHS AFTER FORECAST

YEAR	rs	n	t VALUE	SIG. PROB.
1974	0.2166	39	1.350	NS
1975	0.4451	57	3.686	<0.01
1976	0.1652	63	1.308	<0.10
1977	0.5032	68	4.731	<0.01
1978	0.4668	69	4.321	<0.01
1979	0.3716	71	3.325	<0.01
1980	0.5919	71	6.100	<0.01
1981	0.5005	68	4.697	<0.01
1982	0.3617	72	3.240	<0.01
1983	0.3377	70	2.960	<0.01

## (B) ONE YEAR AFTER FORECAST

YEAR	rs	n	t VALUE	SIG. PROB.
1974	0.2049	39	1.273	NS
1975	0.2728	57	2.103	<0.025
1976	-0.1830	63	-1.454	<0.10
1977	0.2366	68	1.978	<0.05
1978	0.2472	69	2.119	<0.025
1979	0.1860	70	1.561	<0.10
1980	0.3661	71	3.268	<0.01
1981	0.1915	68	1.609	<0.05
1982	0.1017	72	0.8553	NS

NS = NOT SIGNIFICANT: SIG. PROBABILITY GREATER THAN 0.10.

From the above table, two points of note stand out:-

(1) Upto six months after earnings forecast is made, there is a highly significant correlation between high ratios of actual earnings to forecast earnings (i.e. high EFR) and high cumulated return residuals. Out of the 10 years examined, 8 provide highly significant

Spearman rank-order correlations.

(2) At one year after forecast, the correlation has become much less significant. In only 5 years out of 9 was the correlation significant at above 0.05 level. Two of the years have significance probabilities above 0.10 and 2 more are close to the borderline of 0.10. In only one case is the correlation as significant as that of the cumulated return residual at six months.

#### 8.5.4 - CONCLUSION

Based on the results of the EFE test, it is possible to make some conclusions regarding the efficiency of the Malaysian market regarding earnings per share information.

Firstly, the market does not appear to differ by a marked degree from the US market in the of processing of earnings information. In the US market, the level of efficiency appears to be somewhere between Stage II and Stage III. That is, it appears to process EPS information very accurately and reacts reasonably rapidly to forecast errors. In the Malaysian market, the investors appear also to have some prior expectations of the "right" EPS for a share. If the actual EPS deviates far from this expectation, the price of the share would drop. Owing to the small size of the sample, it is not possible to be more definitive as to the actual connection between EFE and return residuals. The reaction of the Malaysian investors appears to be slower than that of the US (comparing the result of the current test with that of the JLM) in that there are still considerable abnormal movements upto 14 months after the earnings announcement month.

Secondly the Malaysian market appears to be faster changing. Instead of the CRR going flat after a certain time, there seems to be some movement in the opposite direction after the first six months. This reversal is strong enough to cause four of the nine Spearman correlation coefficients to become insignificant between six and twelve months after the forecast.

In conclusion it would seem that the Malaysian market in spite of the previously quoted anecdotal evidence is reasonably efficient with regard to EPS information. It seems as if a certain segment of the market does carry out information processing of the type tested and

it does respond to unusual changes in EPS. However, it also seems from the available evidence that such response is not very rapid and could provide opportunity for abnormal gain. It can therefore be said to be only Stage II efficient.

## EXHIBIT 8.5.1

AN EXAMPLE OF WORKSHEET EMPLOYED FOR CONDUCTING THE EFE TEST  
BOUSTEAD HOLDINGS BHD

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
CY/PER	EPER	YPBT	#SH	PBTPS	RM	ADJ PBTPS	a	b	EARNINGS FORECAST	EFR	6-MONTH CRR	1-YEAR CRR
68/843	814	1800	5000	36.0	1.0000	36.0						
69/895	865	1416	7000	20.2	1.4000	28.3						
70/947	916	1614	7000	23.1	1.4000	32.3						
71/1000	966	1777	10000	25.4	1.4000	35.6						
72/1052	1016	3105	12000	31.1	1.8438	57.3						
73/1104	1070	6079	15000	50.7	2.2213	112.6	- 6.7	3.33	178.1			
74/1156	1121	8139	15091	54.3	2.7657	150.2	-46.6	2.72	172.4	1.22	-0.2819	-0.1506
	1173	11456	15091	75.9	2.7657	209.9						
75/1208	1208	10409	15091	69.0	2.7657	190.8	-51.2	2.88	137.7	0.91	-0.0238	-0.0965
	1226	5736	15091	24.2	2.7657	125.1						
			15091	13.8	4.2122							
76/1261	1259	4840	15091	32.1	4.2122	135.2	-47.2	2.85	174.8	0.99	0.01716	0.02554
	1279	8656	21000	41.2	4.2122	173.5						
77/1313	1309	12410	42000	28.1	4.2122	248.9	-54.0	3.01	251.2	1.21	-0.1274	0.0428
				15.5	8.4243							
	1332	15126	42000	36.0	8.4243	303.3						
78/1365	1361	15159	46000	20.5	8.4243	304.3	-69.6	3.35	348.2	1.08	-0.1367	0.13452
				14.2	9.2667							
	1383	18652	46000	40.5	9.2667	375.3						
79/1417	1413	20810	46000	45.1	9.2667	417.9	-76.3	3.48	496.9	0.95	0.2475	0.02706
	1430	23420	46000	50.8	9.2667	470.7						
80/1469	1456	26520	61600	31.9	9.2667	532.8	-68.2	3.35	534.5	0.90	-0.2466	-0.4780
				19.2	12.3556							
	1486	24107	61600	39.1	12.3556	483.1						
81/1521	1507	20323	61600	33.0	12.3556	407.7	-56.0	3.15	461.2	0.68	-0.1371	-0.0048
	1535	16145	61600	13.0	12.3556	313.5						
				9.9	15.441							
82/1574	1570	12143	82133	14.8	15.441	228.5	-35.8	2.78	434.6	0.76	0.2241	
83/1600	-	20350	142625	14.3	23.1662							

(1) CY/PER = CALENDER YEAR/PERIOD

(2) EPER = EARNINGS ANNOUNCEMENT PERIOD

(3) YPBT = 12-MONTH PROFIT BEFORE TAX

(4) #SH = NUMBER OF SHARES OUTSTANDING AT TIME OF EARNINGS ANNOUNCEMENT

(5) PBTPS = PROFIT BEFORE TAX PER SHARE

(6) RM = CAPITALISATION CHANGE ADJUSTMENT FACTOR WITH ALLOWANCE FOR COST OF RIGHTS

(7) ADJ. PBTPS = ADJUSTED PROFIT BEFORE TAX PER SHARE

(8) a = THE y-INTERCEPT IN THE REGRESSION OF EPS ON AVERAGE EPS

(9) b = THE SLOPE OF THE REGRESSION

(10) EARNINGS FORECAST = SELF EXPLANATORY

(11) EFR = EARNINGS FORECAST RATIO

(12) 6-MONTH CRR = SIX-MONTH CUMULATED RETURN RESIDUAL

(13) 1-YEAR CRR = ONE-YEAR CUMULATED RETURN RESIDUAL



## CHAPTER NINE

### SUMMARY AND CONCLUSION

#### 9.1 - Restatement of Research Objectives and Hypothesis

The research described in this dissertation has four main objectives, the last of which is also in the form of a hypothesis to be tested. These four objectives, which have been previously examined in detail in Section 1.4 are :-

- (1) To carry out an analysis of the characteristics of the Malaysian stockmarket (in short : An Analysis of Malaysian Stockmarket);
- (2) To carry out an analysis of the efficiency of the Malaysian stockmarket in respect of a wide range of information (in short: An Analysis of Malaysian Stockmarket Efficiency);
- (3) To compare the efficiency of the Malaysian stockmarket vis a vis the Western Markets more particularly the US market (in short : A Comparative Study of Malaysian Stockmarket Efficiency); and
- (4) To examine the applicability of the traditional model of market efficiency in the light of the above findings and to suggest possible modifications/extensions to the traditional model of informational efficiency (in short: A Proposal for a New Model for Stockmarket Efficiency).

These four objectives will be briefly summarised below.

##### 9.1.1 - AN ANALYSIS OF THE MALAYSIAN STOCKMARKET

Unlike the traditional model of stockmarket efficiency, the model which is hypothesised in this dissertation does not assume the existence of an ideal set of conditions for market efficiency. Instead, this thesis hypothesised that stockmarket efficiency is

dependent on its environment and that not all stockmarkets are in possession of the ideal conditions.

It is is therefore proposed that the attainment of the ideal conditions for efficiency is dependent on certain characteristics of the market. Some of these characteristics are thought to be :-

- (1) The mix between institutional and small investors;
- (2) The quality and quantity of financial publications available;
- (3) The level of disclosure and the the quality of corporate reports;
- (4) The financial literacy of the investing public; and
- (5) The inclination and objectives of the investors.

The first objective of this study is to carry out an analysis of the Malaysian market along each of these dimensions so as to develop some prior expectations of the degree of efficiency of the market. The write-up of this analysis is presented as Chapter Two of this dissertation. In addition, there is further analysis of the market in Part II of Chapter Six.

#### 9.1.2 - AN ANALYSIS OF THE EFFICIENCY OF THE MALAYSIAN STOCKMARKET

The second objective is to conduct efficiency tests on a wide range of Malaysian information. By applying Beaver's concept of "signal efficiency" rather than Fama's concept of "form efficiency", the signals chosen for testing are not limited by any artificial classification. They are instead chosen because they are signals which are efficiently processed in the US and because they make full use of the information within the database. Seven types of signals, organised into two categories are chosen:-

- (1) Transaction Information
  - (a) Price Periodicity;
  - (b) Price Moving Average; and
  - (c) Relative Strength.
- (2) Accounting Information
  - (a) Dividend Yield;
  - (b) Dividend Growth;

- (c) Stock Split; and
- (d) Earnings Forecast Errors.

### 9.1.3 - COMPARING THE EFFICIENCY OF MALAYSIAN STOCK MARKET

There are two problems in attempting to compare the efficiency of the Malaysian market against the Western markets. The first problem is that there is no pre-existing and acceptable framework for doing so. As has been shown earlier, Fama's "three-form" concept of efficiency is not workable because of the ambiguity in the definition of the "strength" of a particular type of information. It is therefore not possible to say that one market is more efficient than another merely because it treats one artificially demarcated group of information efficiently while the other does not. This dissertation takes the view that all types of information are "equal" from an efficiency viewpoint and that efficiency in terms of a particular type of information cannot be extrapolated to mean efficiency in respect of another type of information whether the latter is of the same group or not, however the "group" may be defined.

The rejection of Fama's concept of efficiency would give rise to two problems in a comparative study. Firstly, if one type of informational efficiency cannot be defined as being "stronger" than the others, how would one compare the efficiency of two different markets? If stockmarket efficiency is a black or white issue, there would be no problem. It is accepted that few markets are either totally efficient or totally inefficient with respect to a particular piece of information. If so, how does one make a qualitative statement about the relative efficiency of two markets in respect of a particular signal which is not treated with perfect efficiency by both? This dissertation therefore "invents" a framework for making such a comparison. That is the "Three Stage" system which has been described in detail in Section 1.4.3. It is accepted that this system is far from perfect and to a very large extent the division is arbitrary. However, it is thought that a finer method of comparison is required when making overall statements regarding the relative efficiency of two markets.

The second problem of comparison is that it is not possible to do a direct "one-on-one" comparison for all the seven types of information

tested. Owing to the differences in the nature of the markets, the desire to make full use of a smaller body of data and differences in the translation of practitioners' methods into workable tests, only five of the seven tests carried out afford a direct comparison of how Malaysian and Western markets behave. This problem may not be that serious because of the great number of tests which have been performed on the Western markets. Although a particular piece of information may not have been tested in the West (e.g. "relative strength" as defined by this dissertation), very closely related information has been tested (i.e. in this case "moving average" and "filter rule") and it should be feasible to draw some conclusions from the results of these comparable tests.

#### 9.1.4 - PROPOSAL FOR A NEW MODEL OF MARKET EFFICIENCY

The model of market efficiency proposed rests on the following four ideas regarding the information/market system (References to the particular section of the dissertation where the idea has been previously expounded are annotated):-

- (1) The existence of the ideal conditions for efficiency is not automatically assumed (Section 1.3.2);
- (2) The cost of information is not zero and different types of information have different cost of search (Sections 1.4.4 and 4.2);
- (3) The efficiency with which a market treats a particular signal would be dependent on its cost of search and the market's correct comprehension of it (as in (2) above); and
- (4) The efficiency with which a stockmarket treats a type of information is not uniform over time nor over market sectors (Section 1.3.2).

From these four ideas, a new model for describing the informational efficiency is developed (the Mosaic Model). This model has been described in some detail under Section 1.4.4.3. For this part of the dissertation, it suffices to describe its more important features:-

- (1) Two securities markets are unlikely to be identical as to the efficiency with which they deal with all types of information;

(2) Markets differ in their efficiency because of the differences which exist in the number and literacy of the participants and differences in other environmental factors;

(3) Within each securities market, it is difficult to state a uniform rule regarding its behavior in respect of all information available in that particular market;

(4) Information efficiency can be unique in terms of time, place and market sector. Individual examination with regard to a particular type of information is required before any statement in respect of its efficiency can be made. Even then such a statement can only be in terms of degree rather than in absolute.

## 9.2 - Conclusions in Respect of Stated Objectives and Hypothesis

### 9.2.1 - CONCLUSIONS IN RESPECT OF FIRST OBJECTIVE- AN ANALYSIS OF THE MALAYSIAN STOCKMARKET

The work in pursuance of this objective is carried out in Chapter Two and to a lesser extent in Chapter Six of this dissertation. An academically sound and detailed descriptive analysis of the Malaysian securities market would be too resource consuming within the context of this dissertation. As a result the work which is carried out is less rigorous than the rest of this dissertation. In order to ameliorate this problem, an attempt is made to gather information from many wide ranging sources. It is hoped that such a wide based view of the market provided by Chapters Two and Six can provide a fairly clear and reliable picture of the nature of the market.

The Malaysian market can be said to be in possession of the following important features which make it different from the major markets of the West.

(1) It is a market with a short "public" history although some of the firms listed on it have been in existence for many decades. Many of the current shareholders have been in possession of their investment for some considerable period as they are the first or second generation controlling owners of such companies. At the same time

there has been a general movement towards shifting the ownership of a percentage of shares to the wider public, in particular, the Malays.

(2) It is a market which has undergone explosive growth in the last 20 years within an economy which has undergone a similar rate of growth.

(3) It is a market that is still more dominated by individual investors and the controlling shareholders rather than large institutional investors or the general public;

(4) It is likely that the mix of participants has changed to a certain extent over the last twenty years. It is probable that there is now a greater proportion of middle class investors because of the transfer mentioned in (1) above as well as the enormous growth in personal savings experienced by the country over the last 20 years.

(5) The lack of strict disclosure regulations, institutional investors, investment publications and full service brokers results in a dearth of investment information in the hands of the general investing public.

(6) It is a market which experiences very great variations in the trading volume as well as very large variations in stock prices.

(7) As can be seen by the large variations in trading volume, there is probably a large group of "floating" investors who move in and out of the market with some rapidity in contrast to what one may call the "basal investors" who have more long term objectives and who provide the basal volume of the market. It is possible that the floating investors and the basal investors form largely mutually exclusive groupings.

From the above, it is possible to make some conjectures regarding the existence of several special features which make it less similar to the Western markets. It is probable that such special features would have some bearing upon the efficiency of the market and the effect they may have will also be discussed below. These special features are:-

(1) The market may be made up of two very distinct groups of



investors. For the lack of more suitable terms, they may be identified as the "long term investors" and the "floating investors". The former probably have been in existence for some time while the latter are more likely to be the newer investors.

(2) It is likely that the long term investors are far more knowledgeable than the floating investors. Such a difference in knowledge is probably partly the result of experience and partly the result of differences in inclinations.

(3) It is possible that the time horizon as well as the investment objectives of the two groups of investors are very different. The floating investors are more interested in the short term and tend to adopt more of a "quick-in quick-out" investment method.

If the above conjectures are correct, we would expect the existence of a "two-tier" market in terms of investors and efficiency. At the investors level, it is possible that there exists investors who may be as knowledgeable as their counterparts in the West. At the same time, there possibly also exist investors with much less knowledge with a less rational approach to their investment.

It is probable that the former are less likely to give rise to any sign of inefficiency. If there are to be any inefficiencies, such inefficiencies are more likely to be of the shorter term variety. Over the long run, such short term inefficiencies are likely to leave minimal trace.

#### 9.2.2 - CONCLUSIONS IN RESPECT OF SECOND AND THIRD OBJECTIVES - ANALYSIS OF MALAYSIAN STOCKMARKET EFFICIENCY AND COMPARING THE EFFICIENCY OF MALAYSIAN STOCKMARKET

It is felt that it is probably more effective to discuss these two objectives together rather than separately since they are so closely related. The work in pursuant to these objectives has been described in Chapters Seven and Eight. This section will be divided into two parts in respect of the types of information tested. Section 9.2.1.1 will discuss Transaction Information as tested in Chapter Seven while Section 9.2.2.2 will discuss Accounting Information which are tested in Chapter Eight.

### 9.2.2.1 - THE MARKET EFFICIENCY OF TRANSACTION INFORMATION

#### (A) General Comments on the Efficiency of the US Market

Three types of transaction information are tested viz:-

- (a) Price Periodicity;
- (b) Moving Average; and
- (c) Relative Strength.

Apart from some minor exceptions which will be mentioned later, the US market can be said to treat the first two types of information very efficiently. It is not possible to make any direct statement regarding relative strength information as the tests previously carried out appear not to be a correct translation of the practitioner's method.

In terms of price periodicity, inefficiencies seem to exist at the longer terms only. While there is still some controversy surrounding these inefficiencies, the general opinion is that the US market demonstrates some non-randomness surrounding the periods of one year and four years. At the shorter term, there appears to be very little inefficiency to be exploited.

In terms of moving average information, the evidence is that there is no inefficiency to be exploited. In addition, we can note that tests on other transaction information such as filter rule and "relative strength" as defined by Levy reveal no inefficiency in connection with other types of transaction information. Given that such types of information are simple and obvious, it would indeed be surprising that the US market can be made to yield any inefficient results. Had a test been carried out using the relative strength methodology of this dissertation, the probability is high that such a test would yield few signs of inefficiency.

It thus appears that in the US, it is highly probable that most types of transaction information are treated most efficiently (Stage III). The exceptions lie only with the longer terms. It is possible that such inefficiencies exist because technicians are usually short term traders and hence do not attempt to exploit such inefficiencies.

#### (B) Efficiency of Malaysian market in Respect of Price

## Periodicity

For periods of less than a year, there appears to be some non-randomness in Malaysian stock prices. It is perhaps important to point out there appears to be no economic reason why there should be any cycle over the short term. The technicians' belief is apparently based on something that is akin to the lunar or seasonal cycle. While there could be behavioral and psychological reasons why there should be short term cycles, over the long run such cyclicalities are unimportant. Such cycles, if they ever exist, are likely to be self cancelling owing to their probable non-synchronous nature. (there is some evidence of this showing up in the relative strength test).

For period of one year, there appears to be some non-randomness surrounding the Chinese Lunar Year. As shown by Rozeff and Kinney, autocorrelation may not be the best way to test for cyclicity. By using non-parametric tests, the US prices have been made to show strong signs of non-randomness although autocorrelation tests reveal no sign of such. It is very possible that a replication of Rozeff and Kinney's method on the Malaysian prices will reveal similar one year periodicity since Malaysian prices show up more non-randomness under auto-correlation tests. While the US market demonstrates a one year cycle which is probably tied to the year-end tax selling, such a cycle in the Malaysian market is probably less rational. It is possible that the general "cheeriness" surrounding the Chinese New Year may result in some of the investors willing to "take a flutter". There is no evidence to support this presently. This would be an interesting area for future research.

At the four year level, there is again only minor sign of non-randomness. This is perhaps not surprising as the US cycle is believed to be tied to the presidential election cycle (Allvine and O'Neill) which does not exist in a similar form in Malaysia.

## (C) Efficiency of the Malaysian Market In Respect of Moving Average Information

Overall, it is not possible to demonstrate that the use of moving average trading methods over the long run (8 and 16 years) can yield a greater return than the buy-and-hold method although the return obtained is relatively better than that obtained in a similar test performed in the US (Van Horne and Parker). However, this superficial

reading of the result masks several important findings.

Firstly, it has been shown that the individual stock return achievable is very sensitive to the beta of the stock as well as the return on the stock during the period tested. Secondly, the overall return achievable is also very sensitive to the price behavior of the market during the duration of the test. Thirdly, the test result is sensitive to the price level at the starting and ending points. If the test is started at a time of low general price level and ends at a time of high price level (as with the current test), the result is likely to be bias in favour of the buy-and-hold method. Ideally, this test should endeavour to start and end in years which are more or less at the "mid-point" of the price trend (if there can be any agreement on what constitutes the mid-point of a price trend). Lastly, it can also be seen that some stocks have more pronounced cycles than others which make them more suited for this trading method.

Therefore, until more research is done in this area, it would be premature to conclude that in less sophisticated markets than the US, the moving average method cannot be made to yield superior return than buy-and-hold for all stocks and for all times.

#### (D) Efficiency of The Malaysian Market In Respect Of Relative Strength Information

This test is designed to uncover short term price cycles (of less than 26 weeks) if such cycles exist. The test reveals that it is possible to uncover statistically significant departures from pure randomness in Malaysian stock prices by the use of this trading method. However, in quantitative terms, the amount of abnormal gain to be exploited is small, barely covering the transaction cost in the best cases. There appears to be several reasons why this is so. The first reason appears to be that the method is not capable of "catching" a price rise early enough to yield maximum gain. The second reason is that different stocks conform to different short term cycles and by its nature, the relative strength test of one length is only efficient in showing up cycles of that length. The third reason is that such cyclicalities appear to be random in their occurrence.

It is interesting to note that this test is able to uncover some sign of inefficiency which the moving average test cannot. The important difference between the two is the different time frame of the test.

The moving average test is designed for uncovering long term cycles (socalled primary cycles of about 3-4 years). As stated earlier, the type of investors who are more likely to display irrationality of this type are likely to be the floating investors. Since by definition they are more interested in the short term, it is perhaps not so surprising that the moving average test cannot reveal any inefficiency on an overall basis while the relative strength test does.

#### (E) Summary Comments on the Efficiency of the Malaysian Market In Respect of Transaction Information

In conclusion it is possible to say that the Malaysian market appears to be less efficient than the US market overall. While signs of inefficiency exist, they generally exist for short durations and for individual stocks only. In order to show up such inefficiencies more clearly, the test methods probably have be refined and individualised. When applied to all stocks over the long term, the test methods do not yield much inefficiency. To the extent that it is possible to make an overall comment, the inefficiencies which exist seem to be one of time. That is, non-randomness does exist but there is little time for exploiting them. In that sense therefore the Malaysian market seems to attain Stage II rather than Stage III efficiency compared with the US. In terms of moving average information it appears to be close to Stage III.

#### 9.2.2.2 - THE MARKET EFFICIENCY OF ACCOUNTING INFORMATION

##### (A) General Comments on the Efficiency of the US Market

Four types of accounting information are tested, viz:-

- (a) Dividend Yield;
- (b) Dividend Growth;
- (c) Stock Split;and
- (d) Earnings Forecast Error.

It is more difficult to make an overall comment regarding the efficiency of the US market with respect to these four types of information. They will hence be considered individually.

Dividend Yield - The uncertainty surrounding the efficiency of

this type of information has been discussed fully in Section 4.3.2. Overall this writer leans toward the belief that the US market is highly efficient with regard to dividend information in general and probably very efficient with regard to dividend yield information in specific.

**Dividend Growth** - There is no previous work on precisely this type of information. However, very similar work has been carried out by Watts on dividend change, EPS change and return and by Jones, Tweedie and Whittington on EPS growth, PER and return. Both these tests reveal close to Stage III efficiency for respectively the US and British markets. In addition, other work in this area by Pettit and Aharony and Swary (speed of adjustment to dividend change) again show that the US market is close to Stage III efficient with respect to dividend change information. This writer therefore feels that had similar test been carried out in the US market, dividend growth information is likely to be treated very efficiently (probably close to Stage III).

**Stock Split** - The US market has been shown to be highly efficient with regard to stock split information.

**Earnings Forecast Error** - This type of information is not treated with as great an efficiency as the three previous types. On the whole recent tests seem to indicate that even the US market takes about six months for stock prices to adjust fully to earnings forecast errors. The market is therefore only Stage II efficient.

To the extent that is possible, we can therefore conclude that the US market appears to treat these four types of information very efficiently with the exception of earnings forecast error which is treated quite efficiently.

#### (B) Efficiency of the Malaysian Market in respect of the Dividend Yield Information

The work carried out shows that for most of the periods tested there is almost no significant relationship between dividend yield and return after six months (the mean coefficient being  $-0.007$  and the mean F-value being  $1.079$ ). Over one year, there is slightly more significant relationship with the mean coefficient at  $-0.023$  and the mean F-value at  $1.96$ . The negative mean coefficient implies that if



there is any relationship, the relationship is in the opposite direction to that discovered by Blume.

It is very difficult to make any statement regarding the efficiency of the Malaysian market with respect to dividend yield information. As explained in Section 4.3.2.1, the true informational value of dividend yield is extremely complex and cannot be readily analysed. The fact that there is a lack of correlation between dividend yield data and realised return cannot be taken to mean automatically that the market understands fully the relationship between dividend yield and return and is therefore highly efficient. It is possible for the dividend yield information to be not used at all which would give rise to the same lack of correlation between dividend yield and return. Any conclusion based purely on this one test would therefore be extremely risky.

To the very small extent that we can make any sort of judgement, there are indications that dividend yield information is used to a small degree. The evidence lies in the fact that over one year, there is a more significant negative relationship between dividend yield and return compared with six months. This could be taken as indication that there is a slight investors' preference for high yield stocks which proves to be not justifiable. This conjecture is given some support by the Dividend Growth test which will be discussed later in this section. Both tests seem to indicate that Malaysian investors have some tendency to use historical dividend data to guide their investment decisions. It would be necessary to do further tests in this area before any stronger conclusion can be made. However, if this conjecture stands up, it would mean that in respect of dividend yield information, the Malaysian market is only Stage I efficient. That is, it appears to make use of dividend yield information but uses it incorrectly.

#### (C) Efficiency of the Malaysian Market in respect of Dividend Growth Information

The work of Pettit and others has shown that the US market possesses a remarkable degree of prescience regarding future direction of dividend changes. One can probably attribute this ability to the existence of a large number of publications providing dividend forecast for the listed firms (for example, a US broker firm this writer is familiar with provides a monthly update of 5-year dividend

growth rate forecast for over 500 firms). Given that firms like Valueline are known to provide reasonably accurate forecasts, it is not surprising that the market has a high degree of prescience. In Malaysia, there is no such service available to the investors at large. Under such a situation, it would not be surprising for investors to rely on past data to guide their investment decision making if they make any sort of investigation at all.

The basis of the dividend growth test is the belief that Malaysian investors do rely to some extent on past dividend record for their investment decision making. The test result shows that the so-called Class A firms (those with high and consistent DPS growth rate) provide a much lower return than the market average (statistically highly significant for one year after selection). This would seem to imply that there is a degree of "bidding up" in the price of stocks which have performed well in the immediate past. Such bidding up leads to poorer return on these stocks. It would seem that the Malaysian investors' inability to get information early enough (unlike the US investors) leads to this type of inefficiency. In this sense the Malaysian market is only Stage II efficient. (It may be even arguable that it can be classed as Stage I efficient because it makes decision using the wrong information (as against outdated information)). It is therefore evident that it is less efficient than the US market pertaining to this type of information.

#### (D) Efficiency of the Malaysian Market in respect of Stock Split Information

The result of the test on stock splits appears to give very clear indication of inefficiency among the Malaysian investors. The test result confirms the superficial impression a student of that market may have from press comments and investors' reaction on stock splits that the market has an erroneous understanding of the value of a stock split (that is, Stage I efficiency). It is interesting to note the very strong evidence of Stage I efficiency in this case compared with the less strong evidence of Stage II efficiency in respect of dividend growth and earnings forecast error information to be discussed next.

This writer believes that this is probably a manifestation of the two-tier market discussed earlier. The sharp rise in prices of stocks undergoing split around the time of announcement can only mean that a

sufficiently large number of investors buy the shares on speculation that stock splits are events of advantage. It is less likely that experienced investors be numbered among the buyers. In fact it is more likely that they would be the sellers since they probably understand the real meaning of stock splits. It is therefore the floating investors who give rise to this sign of inefficiency. Such speculations around the time of stock splits are not likely to have any long term effect. This is indeed so, as shown by the fact that one year after the split announcement, the Cumulated Average Residual is back to nearly 0.0.

(E) Efficiency of the Malaysian Market in respect of Earning Forecast Error (EFE) Information.

This test is based on the belief that the market has a prior expectation of the EPS of listed firms and if the actual EPS is different from its expectation, there will be price adjustment in the same direction as the forecast error. The test conducted permits one to make two important statements about the Malaysian market:-

(a) The market seems to have a prior expectation of the amount of EPS that the listed firms will announce (at least insofar as the sample firms are concerned): and

(b) The market does react in the same direction and magnitude to earnings forecast errors albeit quite slowly.

The test shows that the relationship between EFE and abnormal return is highly significant nine months (on average) after the earnings announcements. After a lapse of 14 months, there is still some degree of correlation. We can conclude therefore that in respect of EFE information, the Malaysian market is quite efficient, almost as efficient as the US market. It differs only in the speed of reaction. In the US, the correlation appears to be nearly over after 6 months while the response here takes more than twice as long. It therefore demonstrate Stage II efficiency in respect of EFE information.

(F) Summary Comments on the Efficiency of the Malaysian Market in respect of Accounting Information

In conclusion we can say that in respect of three of the four types of accounting information tested, the Malaysian market shows greater

degree of inefficiency. In respect of stock split and dividend growth information, the inefficiency is much greater. In respect of EFE information, the inefficiency is only a little greater. The evidence in support of inefficiency pertaining to dividend yield information is too weak for making any strong assertion. It thus appears that overall, the Malaysian market is much less efficient with regard to accounting information.

### 9.2.3 - CONCLUSIONS IN RESPECT OF THE FINAL OBJECTIVE -

#### PROPOSAL FOR A NEW MODEL FOR STOCK MARKET EFFICIENCY

The proposed model (the Mosaic Model) of stockmarket efficiency has been previously described in Section 1.4.4.3 and has been summarised at the beginning of this chapter. There will therefore be no further restatement of its salient points in this section. The Mosaic Model of stockmarket efficiency was developed in the first place based on the literature review previously described under Chapters Three, Four and Five. Since the literature review was conducted using research publications from the West, more particularly the publications from the US and Britain, the universal validity of the model would be in doubt if not further tested. Especially since the US and British markets are probably among the most developed there are. If the model is to have wider application, it must be tested in different environment, an environment which is very different that that of West. The Malaysian market has been chosen for testing the model precisely because it is so different. In this section, we shall examine the how well does the model perform in respect of its four important features when applied to the Malaysian stockmarket.

#### (A) Stocks Markets are Not Identical in terms of Informational Efficiency

This feature of the model appears to hold up well when applied to the Malaysian market. The summary table below shows how differently the Malaysian market treat different types of information using the schema developed in Section 1.4.3.

## DEGREE OF EFFICIENCY IN RESPECT OF EACH MARKET

INFORMATION TYPE	US MARKET	MALAYSIAN MARKET
PRICE PERIODICITY	STAGE II/III	STAGE II/III
MOVING AVERAGE	STAGE III	STAGE II/III
RELATIVE STRENGTH	PROBABLY STAGE III	STAGE II
DIVIDEND YIELD	STAGE III	POSSIBLY STAGE I
STOCK SPLIT	STAGE III	STAGE I
DIVIDEND GROWTH	PROBABLY STAGE III	STAGE I/II
EARNINGS FORECAST ERROR	STAGE II/III	STAGE II

As has been shown in Section 9.2.3, when examined in detail, the differences are even larger. There is therefore little doubt that statement regarding the efficiency of a particular market cannot be automatically applied to another market. Market can and do behave very differently in respect of individual pieces of information.

## (B) Environmental Differences Lead to Differences in Efficiency

In Section 9.2.1 it has been shown that the Malaysian market environment is very different from that of the US, especially in terms of the wide variations in the literacy and objectives of the participants and the amount of public information available. From these special features of the environment, it is possible to develop some prior expectations regarding the likely behavior of the market. From this we can predict that if there were to be any inefficiencies, they are more likely to be in the following areas:-

- (a) Short term rather than long term because the less knowledgeable investors appear to operate on a "floating" basis;
- (b) Information of a more complex rather than simple straightforward nature; and
- (c) Information which requires a great deal of research and comprehensive record rather than commonly available information.

As the results from the seven tests show; the actual behavior of the

market appears to fit in well with our prior expectations. In term of similar type of transaction information, the short term method (relative strength) yields more inefficiency than the long term method (moving average). The same comments may be made with regard to price cycles.

In term of information of different complexity, we see that moving average information is reasonably efficiently treated while dividend growth information is less efficiently treated. At first glance, it may seem that the inefficiency with which the market deals with stock split information is contrary to our expectation. However, from this writer's experience, it is very difficult to convince investors with no background in finance that a stock split is not "something for nothing".

In term of information which requires a great deal of research, it is obvious that information like dividend growth and EFE are likely to be treated with less than perfect efficiency.

As has been shown in the tests, the above expectations are indeed proved to be correct. It thus appears that environment has a great deal of influence on the efficiency of a particular market. The fact that EMH emerged from the US is perhaps not at all surprising considering the advanced state of the securities market there. Similarly, it is perhaps also not surprising that the Mosaic Model should be proposed by a person from a much less developed market.

#### (C) There is No Uniform Rule Regarding the Behavior of a Particular Market in respect of a Particular Group of Information

The proposed model takes issue with the Fama's model with regard to the concept that different types of information of a grouping such as "weak" or "semi-strong" are supposed to be treated in similar manner by the market. While it is true that superficially, the so-called weak form information requires less effort to unearth than the semi-strong information, there are many possible exceptions to this rule (which have been discussed in Section 1.3.1). Thus we have seen that there is some evidence of inefficiency in terms of annual and four-year price cycles which seems to be the simplest data there are to unearth. Similarly, we have seen that one of the simpler information of the semi-strong type - stock split - is treated with the greatest amount of inefficiency. It is thus very risky to extrapolate a market's



behavior over the whole range of information from its behavior regarding one particular type.

#### (D) A Stock Market Is Not Uniform in terms of Time and Market Sector

While it is fairly obvious that different stock markets are likely to be different in terms of efficiency, it is further hypothesised that even the same market can behave differently across time and within its different sectors. This feature of the hypothesis is less supported by the results of tests carried out than the others. While it is clear from the work done in the West that different market sectors can behave very differently (e.g. the "small firm effect"), there has been less work specifically addressed to the comparative study of informational efficiency of a single type of information across time. However, there are some indications from the current series of test that this part of the hypothesis is likely to be correct as well. As shown in the stock split and the moving average tests, the second half of the research period seems to be more efficient than the first half. And as shown by the stock split and EFE tests, the "short term" market is much less efficient than the "long term".

#### (E) Summary of Section 9.2.3

In the final analysis, the Mosaic Model appears to have good explanatory and predictive power with regard to market efficiency. As hypothesised, the US market looks very different from the Malaysian market on an overall basis. Using the lithographic analogy first introduced in Chapter One, we can say that the US market is one which is largely covered with white dots with a sprinkling of medium and dark grey dots. The Malaysian market by contrast appears to be made up of a large proportion of light grey dots and perhaps smaller, roughly equal proportions of medium and dark grey dots. Overall therefore the Malaysian market has much greyer appearance than the US market and we can conclude that the market is much less efficient overall.

### 9.3 - Suggestions For Future Research

Given the limited resources available for a Ph. D. dissertation, the research work that was begun for this project has to be ended at a more or less arbitrary point. Given less limiting circumstances, there are many possibilities for continuing work in this area. This is especially so given the very "green field" nature of the Malaysian market. This dissertation has identified three general areas where it is thought that useful further research may be carried out:-

- (1) Extending the tests as carried out over larger samples and longer periods of time;
- (2) Modifying current tests and carrying out new tests in the light of the results shown up by the first series of tests; and
- (3) Conducting some of the tests designed for this project using different set of data from some other countries.

#### 9.3.1 - EXTENDING THE CURRENT TESTS

There are many constraints placed on a project of this nature and as a result, the tests as carried out are not ideal. Among the limitations imposed are:-

- (a) Artificial starting and ending points;
- (b) Limited sample size; and
- (c) The need to limit the dissertation to a manageable length.

If such limitations do not exist, it is possible to do more even within the bounds of the tests conducted. Some of the ways by which the current tests may be extended are described below.

##### (A) Extend the Period of the Research

Given that the start of the research period is determined by available resources and the end determined by the completion of the dissertation itself, the period of the research is not necessarily ideal. There are several improvements which can be made.

Firstly, given the short history of the market, there is much to be said for extending the research to the beginning of its official existence (1961). This is only a further seven years back and although it would require considerably more resources and not all data would be complete, it would give a unique view of the development of a stockmarket from its birth. It would be interesting to observe how the market may have changed with its development.

Secondly, the Moving Average test is sensitive to the market level at the beginning and end of the test period. A longer test period would make it possible to start and end the test at more unbiased points.

#### (B) Enlarging the Size of the Sample

The sample used covers from 28% to 48% of the population numerically although the coverage in terms of market value is very much bigger. There are several advantages to be gained by enlarging the sample size.

Firstly, it is possible that given the market environment, the efficiency of information pertaining to large companies may be very different from that of the small. It would be very interesting if such tests as the Dividend Growth and the EFE tests could be extended to cover the smaller companies.

Secondly, some of the tests are not rigorous enough given the small size of the sample. There is much to be gained if the Dividend Yield test could be based on a larger sample so that it can replicate more closely Blume's original test method.

#### (C) Extending the Tests Carried out

Owing to the necessity of limiting this dissertation to a reasonable length, the EFE test is terminated although the available data are sufficient for carrying out a more extensive test.

A useful extension would be to turn the EFE test into a "two sided" test rather than one in which only the post announcement reaction to EPS is examined. It would provide more conclusive evidence of the existence of differences between markets if the pre-announcement reaction could be examined.

### 9.3.2 - MODIFYING CURRENT TESTS AND CARRYING OUT NEW TESTS

#### (A) Modifying the Current Tests

There are several improvements/extensions which may be made to the current tests.

Firstly, it would seem that non-parametric tests can be applied to examine price periodicity more closely. If the US experience is any guide, there is likely to be more signs of inefficiency there.

Secondly, the Moving Average test can be possibly be refined to enable it to pick out stocks with higher mobility. Beta coefficients and possibly "market leadership" can be used as screening factors in the first instance.

Thirdly, the Relative Strength test can also be improved if it is used in combination with the result from the periodicity tests. That is, the Relative Strength test can be applied to stocks with known cyclicity.

#### (B) Applying New Tests

An interesting additional test would be to carry out some sort of volume test. Owing to the shortage of time, it is not possible to design and complete a test for the efficiency in respect of volume information. This type of information is rarely tested although technicians are supposed to use it extensively.

Another test of interest would be an "Intrinsic Value" test to validate the fundamentalists' investment method. This test would be difficult to design as the concept of intrinsic value is not a simple one to define. However, Oppenheimer and Schlarbaum have shown that even using a simplified form of intrinsic value, the US market can be made to yield abnormal returns. It is possible that the same method may be applicable to the Malaysian market.

As mentioned earlier in this section, this dissertation has concentrated on efficiency tests although a lot of the data gathered into the database can be further analysed. A very large amount of data relating to individual stock return and behavior of beta is now

available which has not yet been analysed. There is certainly much which can be done in the way of comparing these information and behavior patterns with those of the Western markets.

### 9.3.3 - SUGGESTIONS FOR RESEARCH IN OTHER COUNTRIES

So far, the suggestions for further research are meant to be applied to the Malaysian market. However, the findings of this research and the support they provide for the Mosaic Model would suggest that further useful research can be conducted in other countries/markets.

On a larger scale, there are several securities markets in the East to which little in-depth research has been carried out; for example, Hong Kong, Bangkok and Taiwan. Judging by press comments from these markets, it would seem that these markets share some common features with the Malaysian market and they would be interesting grounds for research. Within a large and complex market like the US, there are also market sectors which require further examination. One's impression is that the OTC market in the US or the USM in the UK shares some common characteristics with the Malaysian market and they would be an interesting areas to test the Mosaic Model.

In a similar fashion, the time dimension of market efficiency has been little examined even in the well researched US market. It would seem that there are useful areas for research there. For example, it would be interesting to go back to the earlier years of the US market and examine its efficiency with regard to Stock Split information. Similarly tests on transaction information can probably be usefully performed on data going back to the beginning of this century.

On a smaller scale, it would be interesting to examine a local feature like the Chinese New Year effect (if it exists) in markets which use the Lunar calender and New Year and contrast this with the behavior over the period in countries using the Gregorian calender.

Moving away from pure efficiency tests, other features of the hypothesised model would require more examination. The relationship between information availability and efficiency would be an area which can be usefully researched. Another possible area for research, although it is difficult at this point to give any concrete suggestion, would be the effect of investors' belief and literacy on

stockmarket efficiency.

## 9.4 - Implications Of The Study

This study has given rise to some implications for various groupings of people connected with the securities market, specifically the Researchers, the Investors and the Policy Makers. The implications in respect of each grouping will be discussed separately below.

### 9.4.1 - IMPLICATIONS FOR RESEARCHERS

(A) This study has shown that it is not possible to make generalised comments across different stockmarkets or even within the same market in respect of informational efficiency. Researchers have to be more specific when making assertions about market efficiency.

(B) This study has shown that market efficiency cannot be automatically assumed. Certain factors can have important influence on market efficiency. When researchers are examining a new market for its efficiency, they have to be aware of the environmental factors in the first place.

(C) Given the validity of the hypothesis proposed, there are interesting areas for further research in stockmarket efficiency.

(D) In conclusion it would appear that the efficiency debate is still not over, further research in new directions would be required.

### 9.4.2 - IMPLICATIONS FOR INVESTORS

(A) Investors ought to be aware that investment techniques which are successful in one particular market may not be useful in another market. This is particularly so in respect of the less developed markets like Malaysia's where there are considerable signs of short term inefficiency.

(B) Although this fact is not given emphasis in the concluding section of this dissertation, it would seem that less developed



markets are much more risky in terms of variability of stock return. The higher return which has been obtainable may not be adequate compensation for the higher riskiness.

#### 9.4.3 - IMPLICATIONS FOR POLICY MAKERS

This section is written based on the assumption that the relevant policy makers believe that it is desirable for the government to interfere in the securities market. This may not be true in all countries.

(A) In so far as it is desirable to have an efficient securities market so as to achieve efficient capital allocation, this study appears to show that it may be possible to improve the efficiency of a particular stockmarket. One possible step would be for the government to require much higher level of disclosure at the listed company level. Another possible step to take would be to require the listed firms to state clearly the true financial implications of all public announcements.

(B) As it has been shown that greater degree of inefficiency is associated with the short term rather than the long term, it is perhaps also desirable for the government to encourage long term investment. This can be done, as in Australia, by applying differential capital gains tax on short and long term trading profits.

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